INTELLIGENCE-FRIENDLY ENVIRONMENTS

A STUDY OF NEW ZEALAND PRIMARY SCHOOL CLASSROOM DESIGN IN RELATION TO MULTIPLE INTELLIGENCES THEORY

FATIMAH ALSAIF
MASTER thesis BY COMPOSITION
VICTORIA UNIVERSITY OF WELLINGTON
SCHOOL OF ARCHITECTURE MASTER, INTERIOR ARCHITECTURE
2011

INTELLIGENCE-FRIENDLY ENVIRONMENTS
A STUDY OF NEW ZEALAND PRIMARY SCHOOL CLASSROOM DESIGN IN RELATION TO MULTIPLE INTELLIGENCES THEORY

BY

FATIMAH ALSAIF

A THESIS BY COMPOSITION
SUBMITTED TO VICTORIA UNIVERSITY OF WELLINGTON IN FULFILMENT
OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF INTERIOR ARCHITECTURE

VICTORIA UNIVERSITY OF WELLINGTON
2011

DEDICATION

This thesis is dedicated to my lovely son Al Hassan, wishing him a bright educational future.

ABSTRACT

Education of young children has been the focus of academic research for many years. However, the impact of educational settings on the effectiveness of classroom instruction and learning progress is largely unconsidered. Multiple intelligence theory (MI) postulates that different types of intelligence affect our ability to learn and that educational programs should be accommodated to each learning style. The present study takes this approach a step further, by proposing that MI elements could be incorporated into classroom design, thus enabling students with different preferences to learn more effectively. Therefore the aim of this study is to **investigate the effectiveness of New Zealand existing primary classroom settings in relation to the theory of multiple intelligences.** This includes proposing possible improvements to the interior design of classrooms with the aim of enhancing children's learning potential.

The thesis includes a case study of four classrooms conducted through: (a) interviewing the classroom users −four teachers and twenty students aged 9-11; (b) observing the daily use of existing classroom settings; and (c) surveying the design of the existing classrooms. The key findings of the study are that most users have a very positive view of their traditional classroom settings but that at present MI theory is not strongly supported by the settings observed in the four classrooms. Classrooms mainly support linguistic and logical-mathematical intelligences, whilst other intelligences are treated as secondary or complementary activities. However, MI settings - proposed by the researcher- are often already present in the classrooms or are suggested and/ or recommended by at least one user.

The key conclusions of this study are that: (1) case study classrooms settings support mainly traditional views of intelligence and teaching; (2) applying MI theory to classroom designs could lead to more efficiency in learning environments; and (3) New Zealand schools could benefit from applying the different MI settings. Thus the study identifies the need to further evaluate cultural implications of MI theory in New Zealand culture. In addition, further studies need to integrate space saving furniture into single classrooms, allowing for more effective MI settings.

ACKNOWLEDGMENTS

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1: INTRODUCTION

1.1 BACKGROUND TO THE STUDY

Children are the future of this planet. Their childhood is the most sensitive period of their lives; hence, it is important to identify and improve upon the key factors that affect and shape it. Learning is one of those factors and learning environments play an important role in supporting and improving the learning process.

I have been interested in buildings dedicated to children's learning since studying for my Bachelor's degree. In 2006-2007, in Saudi Arabia, I completed my bachelor's graduation project, a design for children's science museum. Since then, I have been reading and researching architecture specifically aimed at children. In winter 2007, I arrived to Wellington, New Zealand and continued to pursue my passion for child-specific environments; specifically, looking for connections between architecture and education. I investigated school architecture as well as children and learning environments specifically designed for the young generation.

One book, in particular, attracted me to read more about intelligence in relation to the design world. In **"THE LANGUAGE OF SCHOOL DESIGN: DESIGN PATTERNS FOR 21ST CENTURY SCHOOL,"** the authors propose Designing for Multiple Intelligences as the ideal design pattern for schools (Nair & Fielding, 2007).

Multiple Intelligences theory was one of the first concepts that motivated me to search for the connection between intelligence and learning environments. In 1983, Howard Gardner, the renowned psychiatrist, developed the multiple intelligences theory (MI). MI is a theory that discusses the human mind and its abilities in different aspects (Stanford, 2003). It suggests that teaching in different

styles, according to the students' abilities, could improve the teaching outcome (Stanford, 2003). This theory has become a focal point for many educators, who use it as a foundation for developing an educational theory. The MI theory has changed significantly in application to teaching strategies and educational curriculums, but is, without a doubt, a most widely accepted theory. In some schools around the world, MI is the only accepted educational concept.[1] Since teaching underpinned by MI theory is deemed to improve learning process, this study proposes that designing using MI concepts may yield even more improvements in the learning process.

In order to investigate possible applications of MI theory in New Zealand learning environments, in 2009, the researcher visited Bruce Sheerin, Senior Policy Analyst in New Zealand Ministry of Education, in addition to spending some time in a primary school in Wellington city. The aim of these visits was to identify possible learning environments in which I could apply MI theory. The visits were very informative, as they have revealed that the majority of teachers and school staff members did not support the open plan spaces accommodating several classrooms and, at the time, no studies had been undertaken researching on the interior design of New Zealand classrooms (Sheerin, 2009). Based on this feedback, the research focuses on the interior design of New Zealand classrooms as an independent single learning space.

---

1 The Gardner School, City of Vancouver, Washington USA (The Gardner School, 2011). Multiple Intelligences International School, Philippines (Multiple Intelligence International School, 2008), and P.S. X037 - Multiple Intelligence School, New York City USA (The New York City Department of Education, 2011).

1.2 THE AIM OF THE STUDY

The aim of this study is to **investigate the suitability of New Zealand existing primary school classroom settings in relation to the MI theory.** This includes proposing possible improvements to the interior design of classrooms with the aim of enhancing children's learning potential. Case studies of four Primary classrooms in Wellington city are used to analyse the interior furniture and settings in the classrooms, used by students and teachers in the learning process, according to the elements of MI theory. This involves identifying which classroom settings could support MI theory and help both the teachers and the students to develop the different abilities that MI theory postulates.

To achieve this aim, this study is comprised of three major tasks. The first task is collecting and understanding the necessary data on the MI theory. It includes searching for any connection between the extant MI theories and learning environments and reviewing any existing learning environments design guidelines. The second task is analyzing the information gathered and proposing ideal interior design settings for different activities for primary classrooms. Through using the eight intelligences' definitions, characteristics, and teaching strategies, in addition to some design guidelines, this research creates a group of settings for each type of intelligence. The final task involves two sub-tasks. The first is a case study on primary school classrooms in New Zealand according to the criteria designed in the previous task. This sub-task is completed by interviewing teachers and students of the selected primary schools about the classroom settings and analysing the existing settings in terms of their compatibility with the MI theory. The second sub-task is suggesting improvements for the interior design of the classroom setting.

1.3 Overview of the study

With the exception of the first chapter, which is the general introduction to the current study – consisting of the background, the aim of the research, and the thesis outline – this thesis is divided into two main parts. The first part (Chapter 2-5) is a literature review on the Multiple Intelligences theory and learning environments in New Zealand and abroad. The second part (Chapter 6-9) presents the research project, including the research methodology, case studies of four primary classrooms, and the conclusions.

Chapter 2 describes the MI theory as an educational theory and its application to teaching strategies and curricula. It explains how the concept of intelligence has developed through time. It also delineates the history of the MI theory development and the criteria used to define intelligences. Chapter 3 focuses on the eight intelligences of the MI theory. It defines each intelligence type, including abilities and associated learning activities. It also gives examples of teaching strategies based on the MI theory. Finally, for each type of intelligence, settings and related applications for the learning environments are proposed. Chapter 4 gives a brief background on designing learning environments in general. It includes a brief analysis of most of the current designs. It discusses the concept of designing for young people and the importance of involving the user in the design process. Chapter 5 presents information on learning environments in New Zealand. It describes the history of schools in addition to the current system of building and maintaining schools in New Zealand. Information on the use of the MI theory in New Zealand is also given and most pertinent extant studies in this field are presented.

The second part starts with Chapter 6, presenting the research methodology adopted in this study. It focuses on case study strategies, as the chosen methodology for this research project. Based on Chapter 3 and 4, the MI theory principles are transformed into design criteria for classroom settings. It defines the 'units' of the case studies – classrooms, students and teachers – and presents their selection methods and criteria. This chapter also describes methods of collecting and analyzing information on primary schools classrooms. Chapter 7 presents background information and the key features of the four case studies, including floor plans, site plans, and interior photographs. In Chapter 8, analysis of the settings for each type of activity in the four classrooms is conducted. It is combined with the user's interviews and the researcher observations, thus providing a comparison between the four classroom's settings. Furthermore, each setting is discussed in terms of how it supports MI theory learning; thus yielding information on which intelligences could be served with certain types of classroom settings. Design issues and problems in the four classrooms are identified and potential practical solutions offered. The chapter concludes with a review for the study proposition, based to the results of the research project. Finally, Chapter 9 discusses research findings and overall conclusions stemming from the study. Suggestions for possible future research conclude the thesis.

The research methodology, unlike the standard layout typically followed by most theses, is included after the literature review section, at the beginning of the research project part. There are two reasons for this design. The first is that the thesis writing instruction from the book **"HOW TO WRITE A BETTER THESIS"** by Evans and Gruba (2007) is used to guide this writing process. The second reason is that the first part of the thesis contains the published information on the topic, whereas the second represents the original

work and ideas. The research methodology falls under the second category.

CHAPTER 2: THE THEORY OF MULTIPLE INTELLIGENCES

As discussed in the previous chapter, this study uses the Multiple Intelligences theory as a framework for assessing New Zealand primary classrooms. Thus, to achieve the aim of this study, it is important to understand the MI theory. This chapter focuses on the MI theory, explaining it in detail and giving an outline of its development.

The chapter is divided into four sections. The first section explains the history of the concept of intelligence and the differing opinions as to how intelligence may be measured. It discusses traditional views about intelligence and their universal validity. The second section briefly outlines the development of the MI theory, focusing on the circumstances that led Howard Gardner to develop the theory. It also includes Gardner's multiple intelligences theory definition and the criteria for intelligences to be included in the MI theory, in addition to a brief discussion of the eight intelligences. In section three, the MI theory is discussed as a teaching strategy. This section compares teaching and assessing based on the MI theory to that conducted in the traditional way. Finally, section four discusses some differing opinions and how Gardner and colleagues respond to these criticisms.

2.1 HISTORICAL BACKGROUND FOR INTELLIGENCE

A century ago, intelligence was considered a quality that could be measured by an intelligence quotient test, or an IQ test. This view, called psychometric intelligence, underestimated the certain intelligence of some groups (Baum, Viens, & Slatin, 2005). Intelligence studies have been dominated by the psychometric view for almost a century (Gardner, 2001). According to the

23

psychometric view, everyone is born with a certain level of intelligence and it is difficult to change this potential or develop it beyond that set level (Gardner, 2001). This psychometric view, or general intelligence (Gardner, 1998), was developed in the early 1900s by Alfred Binet, a French psychologist, following a request from the French Ministry of Education. Binet and his colleague Theodore developed a test to assess and measure the intelligence of children. This test depends mainly on abilities such as verbal memory and numerical reasoning. In the 1920s, Lewis Terman, an American psychometrcian, introduced IQ tests in the United States as the first pencil-and-paper intelligence tests. Terman's work introduced the concepts of inheriting intelligence and postulated that intelligence cannot change. This traditional view of intelligence had become the determining force in teaching, learning, and assessment in schools (Baum, Viens, & Slatin, 2005). However, *"if the dozens of IQ tests in use around the world were suddenly to disappear, would we no longer be able to assess intellect?"* (Gardner, 1998, p. 20). Intelligence does not need a test, or even a group of tests used before developing the IQ tests, to determine its level (Gardner, 1998).
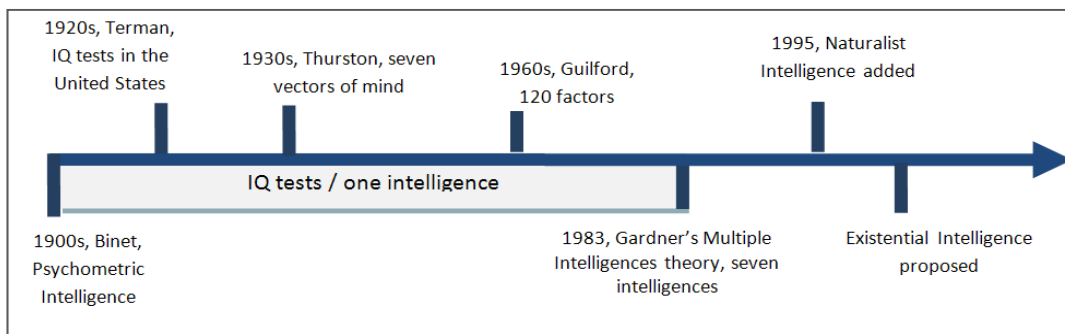
FIGURE 2-1. INTELLIGENCE DEVELOPMENT. ADAPTED FROM BAUM ET AL., 2005; GARDNER, 1998; AND GARDNER, 2001.

Since the 1920s, when IQ tests entered the United States' educational programs, critics have passed judgment on IQ tests and the psychometric view of intelligence. Some critics, such as Louis L. Thurston, claimed that intelligence had many dimensions and was impacted by many factors (Baum et al., 2005). In the 1930s, Thurston, of the University of Chicago, claimed that it made more sense to discuss the "seven vectors of the mind" (Gardner, 1998). The seven vectors, or primary mental abilities, are verbal comprehension, word fluency, number facility, spatial visualization, associative memory, perceptual speed, and inductive reasoning (Baum et al., 2005). In the 1960s, 120 factors were identified by Joy P. Guilford of the University of Southern California (Gardner, 1998). Other critics point out that the IQ test does not help individuals to understand intelligence, and it focuses on a small range of human abilities, such as mathematics and language abilities (Baum et al., 2005).

In the past few decades, philosophers and psychologists have explored various theories using psychology, anthropology, sociology, and education to define intelligence more broadly. Three theories from that period described intelligence. Sternberg's triarchic theory proposes three sub-theories: componential, experiential, and contextual intelligence. Each sub-theory depends on the individual information-processing mechanisms. The componential sub-theory tries to identify the relationship between certain behaviours and the environment. The experiential sub-theory depends on intelligence developed from people's experiences. Finally, the contextual sub-theory deals with intelligent activities for certain environmental contexts. Another theory is Ceci's biocological approach, which includes cognitive process, knowledge, domain, cognitive complexity, and IQ. The biocological approach focuses on dimensions outside the individual, such as schools, other people, technology, and culture. The third theory is

Howard Gardner's theory of multiple intelligences (Baum et al., 2005). Gardner encourages parents and educators to see children in a different light, according to their development in different academic areas. Thus Multiple Intelligences theory understands that *"children do not fit a single prototype"* (Stanford, 2003, p. 81).

2.2 THE MI THEORY

Almost 80 years after the first intelligence test, Gardner argued that intelligence cannot be measured by a single score. In 1983, Gardner suggested that there are seven intelligences (Stanford, 2003), which cannot be measured only with paper-and-pen tests (Gardner, 1998).

Gardner is an American professor of education and co-director of Harvard's Project Zero.[2] In 1961, Gardner started writing a book about human abilities, titled **"KINDS OF MIND".** In 1966, this book became **"FRAMES OF MINDS."** This book explained, for the first time, the theory of multiple intelligences. Later, in 1979, Gardner participated in **"THE NATURE OF HUMAN POTENTIAL PROJECT"** with a group of educators. After finishing this project, he wrote a book about what had been established about human cognition and abilities. During this time, a research program that developed into the Multiple Intelligences theory was started.

Gardner tried to expand the awareness of human capacity beyond IQ tests and define the individual intelligence. Aiming to broaden

---

[2] **Project Zero** is a research group who has investigated children's and adults' learning process since 1967 at the Harvard Graduate School of Education. Its aim is *"to help create communities of reflective, independent learners; to enhance deep understanding within disciplines; and to promote critical and creative thinking"* (Project Zero website, 2009, para. 2).

the view of traditional intelligence and to investigate the validity of shaping an individual's intelligence, Gardner took a group of people outside their natural environments to attempt some tasks they had never done before in two steps (Stanford, 2003). Firstly, in the 1970s and 1980s, Gardner worked on the nature of human cognitive capacities. At Boston University, he tried to understand the patterns of abilities in stroke victims who suffered from some language and cognitive trauma (Baum et al., 2005). He tried to recognize the organization of human abilities in the brain. As a result, Gardner showed that the human brain has different parts, each dominant in various cognitive functions (Gardner, 2003). Secondly, at Harvard Project Zero, he worked with normally developing children to understand the development of cognitive abilities. Gardner's work with these two groups of people led to the discovery of a vital fact about human nature: that people have a wide range of capacities (Baum et al., 2005). He noticed that everyone had a profile of strengths and weaknesses that can comfortably coexist in one human's profile (Gardner, 1998). This was a perfect opportunity to learn about cognition development in normal and gifted children and about the breakdown of such abilities in people who suffered some forms of pathology (Gardner, 2003).

By 1981, Gardner had authored a book on his work in defining intelligence (Gardner, 2003). Gardner argues that the belief that humans possess just one intelligence capacity, which always involves only linguistic and logical mathematical skills, is false (Gardner, 2001). In 1983, **"FRAMES OF MIND"** was published. This book was a significant milestone in the history of intelligence; the theory of Multiple Intelligences was born. As early as 1984, Howard had already met some educators from Indianapolis who shortly thereafter started the first school organized around the concept of

MI theory, the key school.[3] In 1994-1995, naturalist intelligence and suggestions on existential intelligence were revealed. Seven years later, Gardner created his own educational philosophy and determined the importance of achieving understanding in the major subjects — science, mathematics, history, and arts. Gardner and his collaborators also created a middle school curriculum called **"PRACTICAL INTELLIGENCES FOR SCHOOL."**

Howard Gardner broadened the concept of intelligence to cover areas such as music, spatial relations, and social abilities, in addition to mathematics and language abilities (Brualdi, 1996). Human intelligence is much broader and more complex than suggested by the concept of general intelligence and IQ tests. Intelligence is perceived as a set of components — currently eight and possibly more. These components complete the traditional view of intelligence, which supports only mathematics and language abilities (Gardner, 1998).

 "A person's strength in one area of performance simply does not predict any comparable strengths in other areas," said Gardner. *"A human mind is better thought [of] as a series of relatively separate faculties, with only loose and non-predictable relations with one another, than as a single, all-purpose machine that performs steadily at [a] certain horsepower, independent of concept and context"* (Baum et al., 2005, p. 10). Accordingly, Gardner suggested defining intelligence as the capacity for solving problems and creating products in natural settings (Stanford, 2003).

---

3 **The Key school** was established in 1958 by educators and professors who had been concerned about children's intelligence and teaching methods (The Key school website, 2009). In 1984, the school principal, Patricia Bolanos, and her colleagues gave a grant to change the school's curriculum to comply with Multiple Intelligences strategies (Schargel, 2001).

2.2.1 MULTIPLE INTELLIGENCES DEFINITION.

Learning, according to neurobiological research, is a result of synaptic connection between cells in the human brain. It means that different types of learning occur in certain parts in the brain. For example, injury to one part in the brain could affect a person's ability to communicate verbally (Brualdi, 1996). The natural basis of an ability or intelligence is proved by the result of any brain damage, which can result in the lack in some aspects of an ability (Baum et al., 2005). Gardner considers that culture plays a big role in the human intelligence, in addition to the biological bases. Different cultures and societies produce different types of intelligences. Certain tasks that could be common or valued in one culture encourage the individuals to be skilled in specific areas. Therefore, some intelligences might be stronger in one culture than in others (Brualdi, 1996). For example, in the Caroline Islands in the South Pacific, the seafaring Puluwat excels at navigation, whereas in New Guinea, the Manus children learn the swimming skills that the majority of seafaring Western children do not (Gardner, 1998). Based on culture and biological research, Gardner defined his theory in **"INTELLIGENCE REFRAMED"** as *"the biopsychological potential to process information that can be activated in a cultural setting to solve a problem or fashion a product that is valued in one or more community or cultural settings."* (Baum et al., 2005, p. 10).

The MI theory criticises the traditional view of intelligence in three ways. Firstly, it proposes that several intelligences work at the same time, rather than in isolation. Secondly, intelligence is expressed in a person's performance, products, and ideas, not by paper-and-pencil tests. Thirdly, the MI theory recognizes some factors, such as

culture and available opportunities, which affect a person's intelligence and may develop it (Baum et al., 2005).

2.2.2 CRITERIA FOR INTELLIGENCE.

Gardner, in order to define a set of intelligence faculties, developed criteria that each faculty or intelligence must meet to be included in the MI theory. He carried out numerous studies to develop these criteria. He studied psychology, the existence of cell connections in the human brain, case studies of learners, anthropology, and how different abilities are developed or ignored in cultures, cultural studies, and biological sciences (Gardner, 1998).

Gardner (1998) tested each ability according to the following criteria:

1. *Potential isolation by brain damage. For example, linguistic abilities can be compromised or spared by strokes.*
2. *The existence of prodigies, savants, and other exceptional individuals. Such individuals permit the intelligence to be observed in relative isolation.*
3. *An identifiable core operation or set operations. Musical intelligence, for instance, consists of a person's sensitivity to melody, harmony, rhythm, timbre and musical structure.*
4. *A distinctive developmental history within an individual, along with a definable nature of expert performance. One examines the skills of, say, an expert athlete, salesperson or naturalist, as well as the steps to attaining such expertise.*
5. *An evolutionary history and evolutionary plausibility. One can examine forms of spatial intelligence in mammals or musical intelligence in birds.*

6. *Support from tests in experimental psychology. Researchers have devised tasks that specifically indicate which skills are related to one another and which are discrete.*

7. *Support from psychometric findings. Batteries of tests reveal which tasks reflect the same underlying factor and which do not.*

8. *Susceptibility to encoding in a symbol system. Codes such as language, arithmetic, maps and logical expression, among others, capture important components of respective intelligences. (p. 20)*

2.2.3 GARDNER'S EIGHT INTELLIGENCES.

Gardner and colleagues tested various abilities as to whether they met the criteria they set. Abilities that met all or the majority of the criteria were considered intelligences; otherwise they set them aside. Initially, Gardner identified seven intelligences (Baum et al., 2005): linguistic, logical, musical, spatial, bodily, interpersonal, and intrapersonal. Previously, the standard intelligences were mainly linguistic and logical. Spatial intelligence was partially recognised as an intelligence. However, the rest were ignored. In 1995, Gardner added naturalist intelligence as the eighth intelligence. A ninth one, existential, is considered as possible intelligence by Gardner and some educators; however, most researchers do not recognize it as one of the MI intelligences (Gardner, 1998). Although these intelligences involve different areas in the brain, they are interdependent. This means each intelligence works in tandem with one or more other intelligences to create a skill in the human (Brualdi, 1996). Armstrong suggests that each person has all types of intelligences, with different capacities in each type. Furthermore, all types of intelligence work together in special ways that differ from person to another, whereby some people have high levels of all types and others are low in all types (Stanford, 2003).

2.3 MI THEORY IN THE CLASSROOM

The application of MI theory can benefit a classroom through expanding teaching strategies, leading to new curriculums and expanding student assessment. In some studies, unsuccessful and unmotivated students have developed academically when exposed to MI teaching strategies and principles (Stanford, 2003). MI theory posits that students can learn easily and effectively if their favorite learning pathways, strong intelligences, and the curriculum instruction and assessment are considered in the learning process (Gardner, 1998). Everyone possesses all MI intelligences; thus, in a classroom, each student has a different profile of strengths and weaknesses. These profiles determine the level of ease in learning certain information (Brualdi, 1996).

2.3.1 TEACHING WITH MI.

Teachers, according to the MI theory, should think about all the intelligences adequately, whereas traditionally teachers have focused on only mathematical and linguistic intelligences. In the MI theory classroom, the role of a teacher is to expand the students' range of skills and talents. The teacher should prepare and structure the class in order to include all or the most of the MI intelligences. For example, a lesson about revolutionary war could engage most of intelligences of MI theory. A teacher can explain it on a battle map, play revolutionary war songs, organize a play about the war and have some students read a novel or some stories about life during that period (Brualdi, 1996). In the traditional classroom, teachers stand in front of the classroom, ask about previous assignments, write on the blackboard, and then wait until students finish written work. In comparison, teachers in MI classrooms shift methods and teaching strategies, trying to include as many intelligences as possible (Stanford, 2003). Using MI theory in a

classroom reinforces the same material in different ways, in addition to the excitement that students experience during the class time (Brualdi, 1996).

"A STUDY OF SCHOOLING" was a project completed in the United States, which included researchers observing about 1,000 classrooms in the United States. The results showed that nearly 70% of class time was spent with the teacher talking, giving instructions, and lecturing. The second main activity in classrooms is students' written assignments (Stanford, 2003). According to the MI theory, the teachers' job is to use the theory in order to reach beyond the text through providing different opportunities for students to participate in the learning process. MI gives the framework for teachers to expand their strategies in teaching and to have an understanding of their students' intelligences profiles. Additionally, teachers should understand that MI theory gives them a chance to create innovative teaching strategies. At the same time, MI proposes that a teacher's set of strategies may not be the best for all students. For example, teachers who use pictures and images as a teaching strategy will notice that spatially oriented students will respond, whilst others may remain unmoved. For this reason, educators should use a wide range of strategies in order to include all or most of MI listed intelligences (Stanford, 2003).

2.3.2 ASSESSING WITH MI.

Traditional intelligence often bases a student's success only on measuring mathematical and linguistic skills. MI theory considers this assessment unfair. For instance, students with musical intelligences are highly developed in some areas, such as music and rhythms, yet they may be placed in special education classes because they do not meet the required scores in logic and linguistic studies (Brualdi, 1996). Each personal intelligence profile is unique and no two

33

profiles, even those of identical twins, are exactly the same (Gardner, 1998). Thus, effective assessment should work in tandem with instruction. Just developing teaching strategies and curriculums will not reap the full benefits of using MI in the classroom. Strategies of assessment are as numerous as teaching strategies; therefore, teachers also need to change their methods of assessing students' learning (Stanford, 2003). Traditional short answer tests, such as defining words, selecting antonyms, and remembering passages, show students' knowledge in a predetermined manner (Brualdi, 1996). General intelligence assessments depend on scoring these short answer tests (Gardner, 2001). In the traditional classroom, assessment drives the instruction. In contrast, in the MI classroom, assessment and instruction work together (Stanford, 2003). Supporters of the MI theory claim that it is better to allow students to express their knowledge in their own ways, using their strong intelligences. This assessment can happen through methods that include independent projects, student journals, and portfolios (Brualdi, 1996). MI theory opens the door for more creative assessment strategies that allow students to show their knowledge and ability to use the information in unique ways. This new assessment approach does not focus on whether or not students have the knowledge; instead, it tests the ability to use such information. When teachers understand students' strengths, assessment can be focused on teaching to the students' maximum potential. Recent studies have suggested that poor thinkers and poor problem solvers can possess the knowledge and skills, but they may have some problems in using them in certain tasks (Stanford, 2003).

"As children do not learn in the same way, they cannot be assessed in a uniform fashion" (Brualdi, 1996, p. 3). Creating an intelligence profile for each student will allow teachers to assess students

properly. In this way, teachers will also be able to decide what to teach and how (Brualdi, 1996).

2.4 CRITICAL OPINIONS ON THE MI THEORY

As Multiple Intelligence theory has expanded, it has become a target for many critics. Three major criticisms are offered below. Firstly, some researchers argue that MI is not research-based. They claim that the intelligences proposed by the MI theory are actually secondary or even tertiary to general intelligence (g factor). Armstrong claims that general intelligence does exist; however, general intelligence is not superior to other human cognitions. According to MI theory, the g factor has its place, represented by logical-mathematical intelligence, as do the other intelligences or human abilities. The issue is that researchers tend to name the g factor as the only intelligence, and the other seven could be named abilities, talents or faculties, but not intelligences. In developing the MI theory, Gardner tested the seven abilities in addition to g factor according to the criteria he had developed. As a result, all the eight abilities met the criteria, proving that all eight abilities are equal (Armstrong, 2009).

The second criticism claims that there is no research proving that the practical application of MI theory in classrooms is effective, and if it is effective, whether that effectiveness is significant. In response, the problem is that MI cannot be tested as a teaching methodology in classrooms. The MI theory does not represent a certain program for teaching, such as **DIRECT INSTRUCTION**,[4] which is applied by trained

---

4 Direct instruction (DI) is a teaching model created by Siegfried Engelmann and Dr. Wesley Backer in the 1960s. It supports well-developed and carefully planned lessons designed around clearly defined teaching tasks. Its creators believe that this model can improve both academic performance and certain effective behaviours. It is being used in thousands of schools in the USA, UK, Canada, and Australia (National Institute of Direct Instruction).

teachers. On the other hand, MI offers a wide range of techniques, strategies, tools, and methods. In classrooms, teachers are encouraged to choose from this range to form their own approaches. In fact, there are many examples of successful uses of the MI theory in classrooms (Armstrong, 2009); some are mentioned in Chapter 3, the second section.

The third major criticism is that the MI theory weakens the curriculum in order to make all students believe that they are smart. Critics argue that MI focuses on labels rather than the skills that every student should master. However, the MI theory suggests different aspects to deal with the differences in children. It supports the basic subjects of learning, such as history, math, science, and reading, just like general intelligence. The difference is that the MI argues that it is not enough to teach these subjects depending on textbooks, lectures, and standardized tests. Students need to investigate the same subjects by involving themselves, which includes using their strengths, such as their bodies, imaginations, and emotions, in addition to their verbal and logical skills (Armstrong, 2009).

Conclusion:

MI theory is a psychological concept that has evolved into an educational theory. It has cultural and biological bases, which makes it suitable for different situations with different individuals. The application of this theory to classrooms has been the focus for many researchers, yet most of the applications are to teaching methods and approaches. Using MI theory in different aspects, such as design elements, is not a focus of researchers yet.

The MI theory involves eight intelligences – linguistic, logical, musical, spatial, bodily, naturalist, interpersonal, and intrapersonal. Any application of the MI theory also involves these eight

intelligences. Studying them is essential, as this study explores its application to classroom design. The next chapter explains the eight intelligences in detail.

Chapter 3: Eight Intelligences: A Study of the MI Theory Intelligences and Implications for Learning Environments

Chapter 2 touched briefly on the eight intelligences of Gardner's theory. Applying multiple intelligences theory in any environment includes dealing with these eight intelligences; therefore, before engaging in the study of primary school learning environments in New Zealand, it is important to understand each intelligence in the theory and their connection to design settings.

This chapter is divided into two sections. The first section explains the intelligences in the MI theory. Each intelligence is then defined and discussed. In addition, each intelligence is described in terms of its use in teaching strategies and design applications. The second section discusses applying all of the intelligences together in a learning space. It gives some forms for MI activity centres, which can be applied to any classroom. Finally, this section provides some examples for learning environments designed according to the MI theory. The information in this chapter is gathered from suggestions only published in books on the MI theory and settings. Personal analysis and discussions about the eight intelligences are presented in Chapter 6.

3.1 Gardner's Eight Intelligences

Currently, Gardner includes eight intelligences in his theory. All of them differ neurologically (Baum et al., 2005) and culturally (Gardner, 1998). Cultural variation might be the main reason for the development of one or two intelligences among an entire group. However, one person can do extremely well in more than one kind of intelligence.

In addition to Gardner's theorized eight, there are other proposed intelligences. The most popular is existential intelligence, which Gardner defines as *"capturing and pondering the fundamental questions of existence"* (Gardner, 1998, p. 22). However, it does not meet all the criteria that Gardner and his colleagues have set for defining intelligences (Baum et al., 2005). Most MI books and articles do not include it as one of the MI intelligences. There is little information on existential intelligence, making it difficult to use in classroom settings. Therefore, it is not discussed in this chapter.

3.1.1 LINGUISTIC INTELLIGENCE (WORD SMART).

Linguistic intelligence is the capacity to use one's native language or other languages for communicating with other people. It includes the written and spoken language (Baum et al., 2005). It also includes the ability to manipulate the structure of a language (Armstrong, 2009). People who are linguistically intelligent are good in storytelling, using descriptive language, reporting, poetic use of language, and word play. They are not necessarily talkative people (Baum et al., 2005). Gardner singles out four aspects that define linguistic knowledge. The first is the ability to use language to convince other people. This ability can be found in leaders and politicians. The second is the capacity to use language as a tool to remember information, like the rules of a game or directions. The third is the ability to use language to explain certain information in the sciences, for example. The last aspect is the ability to use language to explain itself. This ability can be found in language teachers. Gardner suggests that although most people are not poets, they have different degrees of sensitivities to words and languages (Gardner, 2004). This kind of intelligence might be emphasized in products such as word games, novels, newspapers, and lyrics (Baum et al., 2005).

TEACHING STRATEGIES:

Students who are high in linguistic intelligence think in words and love reading, writing, and telling stories. Materials, such as books and writing tools, may encourage them to express their knowledge (Armstrong, 2009). There are strategies used in MI classrooms for word smart students; some encourage them to analyze writing, describe information in words, access the Internet for some extra reading, or outline the lesson (Arnold, 1998).

SOME DESIGN SETTINGS:

The learning environment could be provided with comfortable seating in a book nook or a library area. There could be a language lab centre with audio files, headphones, and talking books. Moreover, a writing centre supplied with writing tools or word processing software would be helpful for linguistic intelligent students (Armstrong, 2009).

3.1.2 LOGICAL-MATHEMATICAL INTELLIGENCE (NUMBER SMART).

Logical-mathematical intelligence is the ability to understand the principles of systems or to manipulate numbers, quantities, calculations, estimates, and problem solving (Baum et al., 2005). This intelligence includes using processes such as categorization, classification, inference, generalization and hypothesis testing (Armstrong, 2009). In contrast to linguistic intelligence, logical-mathematical intelligence is not related to the auditory-oral sphere; instead, it is related to the world of objects, ordering and reordering them (Gardner, 2004). Logical-mathematical intelligent people usually use and appreciate abstract relations. Their intelligence is emphasized in products like graphs, time lines, logic puzzles, and computer programs (Baum et al., 2005).

TEACHING STRATEGIES:

Students who are high in logical-mathematical intelligence think by reasoning. They prefer their learning process to involve experiments, questions, figures, and calculation. To achieve what they love, they need experimental materials and trips to science museums (Armstrong, 2009). Good strategies encourage students to learn easily. Strategies for number smart students could be creating a time line, scheduling, categorizing, having a 'to do' list or following a pattern or formula (Arnold, 1998).

SOME DESIGN SETTINGS:

The classroom may need a math lab, a space for math activities with calculators and math tools, and a computing centre for the logical-mathematical intelligence. In addition, students may prefer chemistry sets, microscopes, and measurement materials in a science centre (Armstrong, 2009).

3.1.3 SPATIAL INTELLIGENCE (PICTURE smart).

Spatial intelligence is the ability to understand the spatial world and transform it in the mind. It could be oriented towards art, as in painting and architecture, or towards sciences like anatomy or topology. It involves the re-creation of images from memory in addition to the production of new visual information or artwork (Baum et al., 2005). Although most spatial intelligence is related to the visual world, it can even be developed in blind people (Gardner, 2004). Blind people can be spatially intelligent, as this intelligence does not depend only on sight (Baum et al., 2005). Spatial intelligence involves sensitivity to colours, lines, shapes, forms, spaces and the relationships between these elements

41

(Armstrong, 2009). Some spatial tests or puzzles are related to logical-mathematical intelligence, as well, as both deal with subjects other than auditory (Gardner, 2004).

TEACHING STRATEGIES:

Spatially intelligent students think in images and pictures and love designing, drawing, and visualising. They can be motivated by art, videos, slides, illustrated books, and trips to art museums (Armstrong, 2009). They can be encouraged by strategies that involve asking them to create shapes for letters, using coloured markers, creating a storyboard, drawing a chart of ideas, or finding a picture related to the content. The strategies differ from one subject to another. For example, in a mathematics class, a picture smart student could be encouraged by creating a bar chart, whereas in reading class, looking for word families or finding some pictures related to the topic could be helpful (Arnold, 1998).

SOME DESIGN SETTINGS:

Some settings that would be very helpful for spatially intelligent students include an art area with paints, some drawing materials, and drawing software. There could be a space for a visual media centre, with videos and animation software, and a visual thinking area supplied with maps, graphs, and three-dimensional building materials (Armstrong, 2009).

3.1.4 MUSICAL INTELLIGENCE (MUSIC SMART).

Musical intelligence is the capacity to recognize and manipulate music and sound patterns. It includes perceiving and understanding sound patterns as well as creating them (Baum et al., 2005). It involves sensitivity to the rhythms, melodies or tone colour of a musical piece (Armstrong, 2009). Anyone can exhibit musical skills

by living a life full of music and learning to read and/or play music. Nevertheless, each person has different levels of musical core talent (Gardner, 2004).

TEACHING STRATEGIES:

Musically intelligent students think in rhythms and melodies. They like singing, whistling, tapping feet, and listening. They could be motivated by trips to concerts, listening to recorded music, and playing musical instruments (Armstrong, 2009). They connect music to their emotions. A good way to motivate them is to let them make up some rhymes using vocabulary words or numbers they need to learn. Other ways are finding songs or music with themes related to the lesson, hearing music relevant to a certain topic, reading notes aloud, and taking notes in rhymes, poems, or songs (Arnold, 1998).

SOME DESIGN SETTINGS:

A special corner for music activities with files of sound effects, headphones, and music library would encourage musical intelligence inside the classroom. The classroom may also need some musical instruments and audio recorders (Armstrong, 2009).

3.1.5 BODILY-KINESTHETIC INTELLIGENCE (BODY SMART).

Bodily-kinesthetic intelligence is the ability to use and control the body or part of the body to create something like a dance performance or to solve a problem, as in sports games. It does not necessarily involve releasing energy through physical activities; it could be through hand crafting for example (Baum et al., 2005). At the core of bodily-kinesthetic intelligence are two capacities. The first is controlling one's bodily motions, as in dancing and swimming, and the other is handling objects skilfully, such as balls play (Gardner, 2004). It involves using the body, or a part of it, in order

43

to express feelings and ideas, or to create products, such as involving hand and fingers in sculpturing. It relies on physical skills that include speed, flexibility, balance and strength (Armstrong, 2009).

TEACHING STRATEGIES:

Students who are high in bodily-kinesthetic intelligence think through bodily sensations. They love dancing, running, jumping, building, and gesturing. They may need role-play, drama, sports and physical games to express themselves (Armstrong, 2009). It is important to match the strategy to the individual student. Other body smart students may like dancing, role-playing, body sculpting, or tapping their feet (Arnold, 1998).

SOME DESIGN SETTINGS:

The designer of a classroom might create some open space for creative movement. There could be a mini-trampoline or juggling equipment for active students. The room may need a special centre for creative hands (supplied with some clay, carpentry and blocks). Moreover, a tactile corner with samples of different textures and materials would attract some students. Finally, a drama centre for performing and role-playing would prove beneficial (Armstrong, 2009).

3.1.6 INTERPERSONAL INTELLIGENCE (PEOPLE SMART).

Interpersonal intelligence is the ability to understand and deal with other people. It involves sensitivity to the feelings, beliefs, and moods of other people. It does not necessarily include a preference for working in groups (Baum et al., 2005). It may include the ability to control facial expressions, voice and gestures, in addition to the aptitude to respond to other people (Armstrong, 2009). It deals

with others' moods, temperaments, and motivations (Gardner, 2004). People who are interpersonally intelligent have the ability to affect others' decisions, feelings and beliefs (Baum et al., 2005)

TEACHING STRATEGIES:

Interpersonal intelligent students think by bouncing ideas off other students or teachers. They love leading, organizing, manipulating, and partying. Being with friends in group games, community events, and social gatherings would motivate them (Armstrong, 2009). Interpersonal intelligence could be incorporated into the class via several strategies. Teachers could ask students to debate, work in groups, interview others about a certain topic, create support networks, or brainstorm with others (Arnold, 1998).

SOME DESIGN SETTINGS;

Interpersonal intelligence settings could be applied to a classroom in a number of ways. A round table for group discussion or working would be one way, as would paired desks for peer teaching or a social area where students can find some board games and comfortable furniture for social gathering (Armstrong, 2009).

3.1.7 INTRAPERSONAL INTELLIGENCE (SELF SMART).

Intrapersonal intelligence is the capacity to understand oneself, including one's feelings, moods, intentions, and needs. It involves the ability to express oneself through other intelligences, such as painting, singing, or poetry. Self smart persons do not necessarily prefer to work individually or in isolation (Baum et al., 2005). Intrapersonal intelligence deals with the development of a person's internal characteristics. It determines the ability of someone to access his or her own feelings and then control them (Gardner, 2004). It involves the ability to act adaptively according to self

knowledge, alongside the capacity for self-understanding and self-esteem (Armstrong, 2009).

TEACHING STRATEGIES:

Students who are high in intrapersonal intelligence think in relation to their feelings, needs, and aims. They love setting goals, dreaming, planning, and reflecting, and they may need secret places, time alone, and individual projects (Armstrong, 2009). Self smart students would like discovering, having freedom to be creative, questioning, reviewing, writing in a journal, or planning for the future. All these strategies motivate and encourage students to express their knowledge in different ways (Arnold, 1998).

SOME DESIGN SETTINGS:

Self smart students might prefer study carrels for individual work, lofts with nooks for privacy, or a computer corner for self-based study (Armstrong, 2009).

3.1.8 NATURALIST INTELLIGENCE (NATURE SMART).

Naturalist intelligence is the ability to distinguish living creatures (plants and animals), in addition to the ability to be sensitive to other natural features and patterns. It involves knowledge of the natural world. It is not, however, limited to the outside world (Baum et al., 2005). Nature smart also includes the capacity to distinguish objects in urban environments, such as cars and CD covers (Armstrong, 2009).

TEACHING STRATEGIES:

Naturalist intelligent students think through nature and natural forms. They love playing with pets, investigating nature, raising animals, and caring for Planet Earth. It is important to provide them

46

with access to nature, opportunities for interacting with living creatures, and tools for the natural investigation (Armstrong, 2009). Teachers and educators can use natural intelligence teaching strategies, including field trips to natural resources, studying patterns in natural objects, connecting a natural phenomenon with content of a certain lesson, or reading weather reports in the daily report (Arnold, 1998).

SOME DESIGN SETTINGS:

Classrooms may include areas for supporting natural intelligence. These areas could be a plant centre with gardening tools and supplies, an animal centre with a rabbit cage or an ant farm, or an aquatic centre with an aquarium or a fish tank for studying and observing underwater life (Armstrong, 2009).

3.1.9 AN EXAMPLE OF USING MI AS A TEACHING STYLE.

The MI theory can help students strengthen their weaknesses through using their strongest or most-favoured intelligences. For example, a student may have difficulty learning certain information in a traditional classroom setting. Considering her or his cognitive intelligences, as well as bodily, interpersonal, and musical intelligences, would encourage her or him to strengthen the weaknesses (Nair & Fielding, 2007).

Armstrong (1994) claims that using MI as a learning style is simple: For any lesson or theme, teachers must link the instructional objective to the multiple intelligences. In other words, it is linking the lesson to words, numbers or logic, pictures, music, the body, social interaction and/or personal experience.

Armstrong tried using MI theory to teach a group of children a lesson about telling time. He started by telling a story about a 'LAND OF NO TIME' and how it was difficult for people to live without knowing the time (word smart). A king sent a group of people to a Land of Time asking for help. When the group arrived, they found a family with 12 children. Twice a day, each child would go to the top of the land and shout a little rhyme telling the time (music smart). The family eventually helped the Land of No Time become another Land of Time.

After finishing the story, some students got up and stood in a large circle representing a clock, and 12 students role-played the numbers in the clock (body smart) and sang the rhymes from the story (music smart). The students went to their desks to write some stories about time, illustrated by some clock faces (word, picture smart). After finishing writing, students returned to the circle and shared their stories and pictures (people smart).

This class took about an hour and a half. During that time, most of the intelligences were used. Students used their bodies, music, voices, and logical minds in counting numbers, as well as self spirit, cooperation spirit, and linguistic and spatial intelligences. This teaching strategy could easily be expanded or adapted to other lessons. It is not a restrictive method or style. Teachers and students can add and innovate in each lesson. Although teachers might not be able to involve all intelligences in their plans, the previous example shows how a teacher can reach as many intelligences as possible (Armstrong, 1994).

3.2 WAYS OF APPLYING GARDNER'S THEORY TO LEARNING ENVIRONMENTS

3.2.1 MI CONFIGURED SETTINGS.

Thomas Armstrong (2009) suggested various classroom settings that support MI theory. Creating "intelligence friendly" classrooms with activity centres can widely expand children's exploration in each intelligence. MI activity centres could exist in several forms, whether open-ended or topic-specific, permanent or temporary.

Permanent open-ended activity centres are designed to supply students with a wide range of experiences in each intelligence. Each centre could be named according to the intelligence that it serves. A centre for each of the intelligences could be created by utilising some of the settings mentioned in the previous discussions. For example, a centre for linguistic intelligence could include settings such as a language lab and writing centre.

Alternatively, temporary topic-specific activity centres can change frequently according to certain themes or topics being learned at a specific time. The teacher can create eight different centres for a specific topic for a limited time, such as a day or a week. Each centre will let students learn information about the topic through one intelligence.

Temporary open-ended activity centres involve explorations that can be set up and taken down quickly. They could be on eight tables or working mats with some materials that allow organizing several free activities. Usually, these activities involve games, such as Scrabble for linguistic intelligence, Pictionary for spatial intelligence, Twister for bodily intelligence, or Monopoly for logical intelligence.

Finally, there are permanent topic-specific activity centres, a combination of permanent open-ended centres, and temporary topic-specific centres. Each of these centres engages explorations that change monthly or weekly for a year-long theme. For example, the theme of the year could be "change." A monthly topic could be about the change in seasons. The centres, then, represent one season for a week, then shift to the next season. Teachers may use activity cards for each intelligence. For example, a card asks to write a poem about the summer for linguistic intelligence (Armstrong, 2009).

3.2.2 EXAMPLES OF MI ENVIRONMENTS.

Nair and Fielding (2007) propose that some learning environments, like learning studios, are better for applying MI theory than the traditional classroom. The New City School's[5] library is a good model of respecting the MI theory in designing spaces. It recognizes the core mission of the space, which is encouraging students to read. However, it considers ways beyond the linguistic and logical intelligence of the traditional libraries to do this (Nair & Fielding, 2007).

In 2005, the New City School's library was created to be the world's first MI oriented library. Although this library remains a linguistic place, it supports all the intelligences from MI theory. It supports personal intelligences (intrapersonal and interpersonal) through creating spaces supporting both individual and collaborative work. There are nooks and crannies for individual

---

5 New City School is an independent elementary school in Saint Louis, Missouri, USA. Since the MI theory was first proposed in 1988, it has been used as a tool for teaching and learning in this school. Teachers give the opportunity for each child to learn and express what is learned through the eight intelligences (New City School, 2010).

privacy, and group seating that encourages dialogue. The library also provides a mini-stage where students can perform and express their musical and bodily-kinesthetic intelligences. Moreover, spatial intelligence is considered in a circular space designed for wet art projects and displaying students' art projects. There is also a corner for puzzle games, which support bodily-kinesthetic and logical-mathematical intelligences. The library also considered naturalist intelligence through two huge water tanks. One is for fresh water and the other for salt water, each containing different creatures. As a result, the New City School's library is not just a student place; families and neighbours are welcomed, too. It is not just a reading space; it also a place to learn and research (Hoerr, 2010).

Another example is Saltonstall School in Salem, Massachusetts USA. It has been renovated to incorporate the MI theory in different aspects. One of these aspects is focusing on technology, as good multimedia programs support materials in different ways – verbally, spatially, musically, and logically. Each classroom is wired to support computers, a listening centre, and an overhead projector. Following a recent renovation, each classroom now has a wet area to support both art and science projects, expressing spatial, logical, and kinesthetic intelligences. Moreover, classrooms' balconies are now used for weather and science topics, which support naturalist intelligence. Finally, a special room, called "Flow Room," was created to encourage students to focus on topics of particular interest. This room supports the MI theory through the activities that students choose, usually those that suit their strongest intelligences (Kliment, 2001).

Conclusion:

The eight intelligences represent eight human abilities. Each intelligence has sub-abilities or skills that may be shared with other

intelligences. The shared sub-abilities simplify the application of the MI theory to both teaching strategies and interior design settings of classrooms.

Although the theory has taken precedence more in teaching strategies than in design settings, there are various suggestions and proposed ideas for designing MI classrooms. Examples of MI application to learning environments show that most of the concentration is on the overall school design or learning spaces, rather than individual classrooms. It could be because applying eight different sets of settings in a relatively small space is a challenge. Designing with MI activity centres may need a huge space. The possibility of applying these centres in classrooms depends mainly on several factors such as the number of students and activities completed in the classroom. However, most of these ideas are suggested by educators and MI theory supporters. To apply the theory to classrooms, MI needs to be considered by interior designers and architects, taking into account the general criteria and standards that each classroom or children's space should meet. These standards are discussed in the next chapter.

CHAPTER 4: LEARNING ENVIRONMENTS- A BACKGROUND

After discussing the MI theory and the eight intelligences in the previous chapters, this chapter briefly examines learning environments around the world. In order to develop designing criteria from the MI perspective, this study must cover other criteria for designing classrooms and children's learning environments. Therefore, this chapter's aim is to collect data from around the world about design criteria and standards for learning and studying spaces.

Chapter 4 is divided into four main sections. The first discusses the development of classroom over the years. It defines and explains some classrooms models in schools in general. It also gives some explanations for the learning process. The second section discusses the idea of involving children in the designing process. In this section, a project about designing by including children is explained. The third section is about the criteria used in designing for children and some design suggestions. It gives some examples of designers' and educators' contributions in creating learning environments that are claimed to be successful.

4.1 LEARNING ENVIRONMENT EVOLUTION

In the 20th century, two main philosophies shaped the design of school buildings. The first philosophy considered that the teacher was the primary source of knowledge, and it was her or his responsibility to teach a group of learners. The other philosophy was that school building design should be based on the **"FORM FOLLOWS FUNCTIONS"** principle (Dudek, 2005). This principle was

formulated by Louis Sullivan[6] in 1896. It implies that the structure should reflect the function of a space in order to provide a useful perspective for the space (Kosak & Groudine, 2004). However, most schools were designed with additional and non-functional settings (Dudek, 2005). According to these philosophies, the traditional Ford, or Cells and Bells, model has appeared. In this model, the classroom is just a rectangular space with a number of students' desks and chairs placed in rows, a teacher's desk in front of the class, and a blackboard (or whiteboard). A group of such classrooms placed next to each other on a long double-loaded corridor, along with some other facilities, supposedly make a school (Figure 4-1) (Nair & Fielding, 2007).

Another model is an evolution of the Ford model. It uses expansion from the main corridor to make it a learning street. This is developed into smaller **"learning streets"** linked to the main one, where classrooms are placed around the streets to create small social learning spaces. Some walls are transparent for natural lighting and communication between classrooms. This model is called the Finger plan (Nair & Fielding, 2007, p. 18).

---

[6] Louis Sullivan was a famous American architect, 1856-1924. He spent most of his life on the development of his thinking about architecture. Sullivan designed many great buildings, such as Grand Opera House, Chicago, 1880, and Chicago Stock Exchange Building, 1893 (Chicago History Museum, 2007).
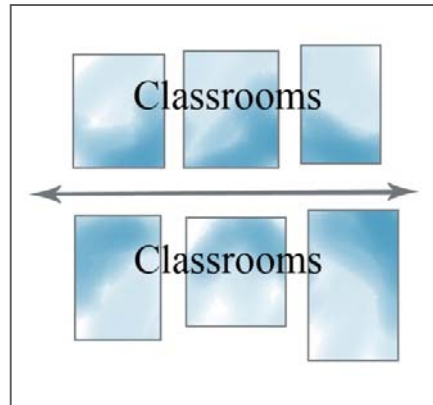
FIGURE 4-1. THE TRADITIONAL CLASSROOM MODEL. ADAPTED FROM NAIR AND FIELDING, 2007, P. 17.
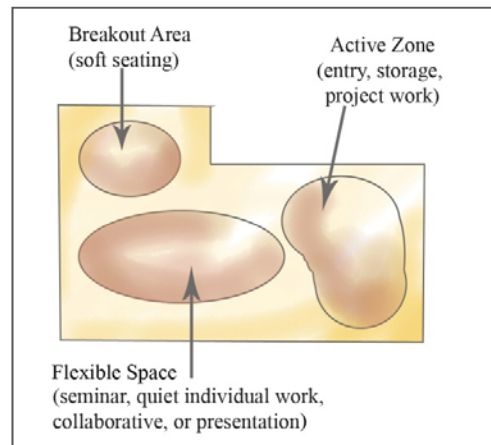
FIGURE 4-2. THE LEARNING STUDIO MODEL. ADAPTED FROM NAIR AND FIELDING, 2007, P. 20.
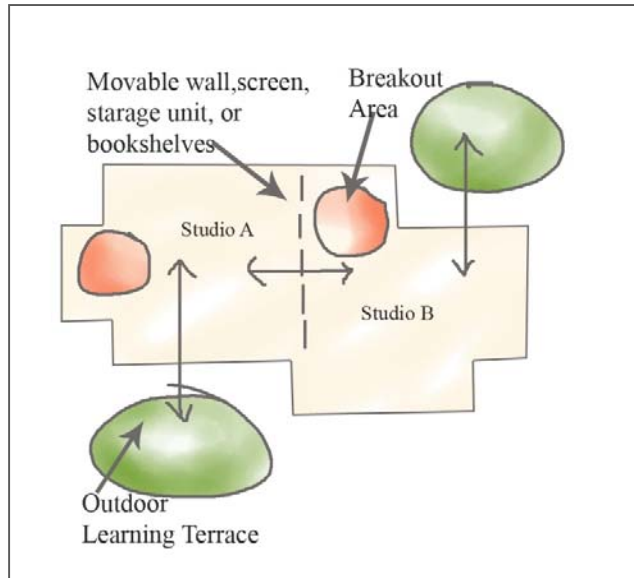
FIGURE 4-3. THE LEARNING SUITE MODEL. ADAPTED FROM NAIR AND FIELDING, 2007, P. 21.
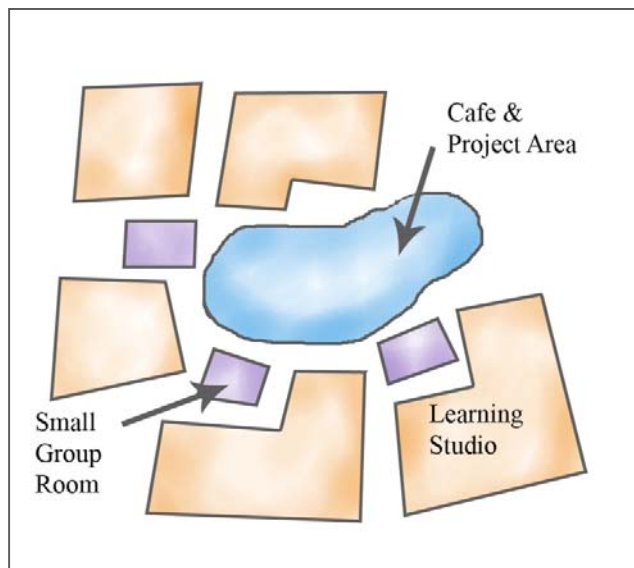
FIGURE 4-4. SMALL LEARNING COMMUNITY MODEL. ADAPTED FROM NAIR AND FIELDING, 2007, P. 24.

Although the studio-based model, or the open plan model, has not become popular until the past few decades, it had been experimented with as early as the late 1800s. These experiments were organised by educators who advocated the child-centered

approach to education the **"QUINCY SYSTEM."** (Nair & Fielding, 2007). The aim of the studio-based model is to centralise students' interests and motivations through active learning, learning by doing, and integrated curriculum. This model enables teachers to know more about their students (Lackney, 1999). It makes a classroom more flexible and transforms it from the rectangular shape into an L-shape. Each classroom, or a learning studio, incorporates a number of activities (Figure 4-2). Two studios could be connected to each other with a movable wall to create a learning suite; the separation could be created using furniture, instead of movable walls (Figure 4-3). Students can share some activities and make it one large studio. The other feature of this model is the indoor-outdoor access in each studio (Nair & Fielding, 2007).

The Small Learning Community is a model developed from the Finger plan and the learning studio models. Each learning community may have its own science lab, teacher workroom and other facilities. It is a multipurpose space that fosters independent and collaborative learning. Like the learning studio model, it has its own connection to the outdoors (Figure 4-4) (Nair & Fielding, 2007).

The last model that has appeared for learning environments is the Advisory model. In this model, a number of groups of students are arranged in a large space around a café or project area. Each group has one or two advisors, not a teacher, and each student has a workstation and a computer (Nair & Fielding, 2007).

The significance of these learning environment models is that they all suggest that learning is not a linear process. It requires some interaction between teachers and students as well as amongst the students (Nair & Fielding, 2007). Accordingly, new schools need to be interactive places where children can learn in interesting ways.

Moreover, bigger old school buildings could be divided into smaller ones to create small communities within the big buildings (De Monchauux, 2007), thus providing flexibility in the learning environments, such as removable walls and open plan classrooms (Hardy Holzman Pfeiffer Associates, 1974).

According to Hardy Holzman Pfeiffer Associates (1974), it is predicted that students in the future will be equipped with learning machines, such as televisions and computers, and these will be connected to a central computer. This extreme view means the role of teachers will get smaller until it vanishes. Nevertheless, the learning environments will still be one of the major factors affecting a student`s mind.

4.2 DESIGNING WITH CHILDREN

A learning environment is the result of the design process. Designing is a process that needs two parties to be complete: designers and clients (users). Both need to participate in the process for a successful design. In designing for children, the children themselves are the real clients. However, they are rarely involved in the designing process (Scaife, Rogers, Aldrich, & Davies, 1997). Architects and designers should understand the human mind and the children's experiences in order to be able to design learning environments. The understanding happens when architects and designers learn and deal with the four realms of human experience: spatial, psychological, physiological, and behavioural. Designing is all about the user's attitude in relation to built environments. Alexander's pattern language is a method being used in complex designs, including schools, to achieve the four realms. Christopher Alexander with others wrote the book **"PATTERN LANGUAGE"** in order to outline the connection between the built environment and the psychology of its users. He identified many patterns, based on

architectural attributes that worked, pleasant spaces, and spaces that attracted people more than others. Those patterns make the designer aware of what makes good and healthy living environments (Nair & Fielding, 2007).

Groundwater (1979) gave an example of designing with children. He explains a dusty classroom at the beginning of a study year and that when children enter this classroom, they transform it to a place they would like to learn in. They transform it from an old dusty room to a room that has numerous activity stations, such as a cooking area, library, and science benches. He also describes children using all the activities at the same time and their teacher participating as one of them while they play the supervisor's role (Groundwater, 1979).

In Sussex University, Brighton, UK, a group of designers and scientists have carried out a project of designing learning tools with children participating. The project proves the necessity of involving the users in the design process, even though they may lack design skills. This concept was tested on school children aged 7-14 in different interactive environments (the number of students involved was not stated). The design process involved teachers, young students, and the design team, and four phases were completed (Scaife et al., 1997).

The first phase was to define the problems that teachers and students may face during classes. That was completed by interviewing a group of teachers and children individually. They were asked about the current learning tools and potential computer-based learning materials. To make it easy, designers chose one subject and one lesson for the project's experiments, which was The Food Chain from the biology class. At the end of this phase, difficulties and problems had been defined. In the second

phase, the designers tried to improve the learning facilities, in order to avoid those difficulties, by designing software as a learning tool or aid. The software was about the food chain. The main feature of this software was its dependency on interaction. In the third phase, low-tech tools were tested. Paper-based materials were used to create learning tools. These were then tested in a number of schools in real learning environments. After that, further tests were carried out with low-tech materials in three exercises. The aim was to design a piece software or a CD-ROM with children's help. The results produced interesting ideas from children, covered some areas that never would have been considered without their help, and most importantly, these ideas were created by children's minds for other children's minds. The last phase was to complete the ideas that had been begun previously, and test them on a group of children who did not participate in the previous test. Teachers were asked for feedback. The conclusions were that children were good in stretching the limits of the software and that children preferred game-like tools for learning (Scaife et al., 1997).

Although not all children are able to participate in the design process and it is not an easy task for designers, it is imperative that users be involved in designing their spaces (Scaife et al., 1997). This project has been completed for designing learning software. However, the concept of designing with children, whether it is a piece of learning software or a learning environment, is the same.

4.3 DESIGNING LEARNING ENVIRONMENTS FOR CHILDREN

4.3.1 CRITERIA FOR DESIGNING FOR YOUNG LEARNERS.

Involving children is a part of the design process. The other parts depend on the designer and the design criteria. The learning environment should be designed in some way that invites the

learner to participate and be a part of the learning process (Dudek, 2005). It should encourage independent learning and serve students' needs and interests. In addition, a successful learning environment is a supportive and productive place where students are the target and teachers are the facilitators (Fisher, 2005). Unfortunately, there are no standard criteria in designing learning environments. Educators and designers have been framing criteria since learning environments have been built. There are many criteria that each designer or association considers in designing learning environments.

For example, Nair and Fielding, who are Indian architects and planners, suggest 18 modalities that the school has to support. These are:

1. *"Independent study*
2. *Peer tutoring*
3. *Team collaborative work in small and mid-size groups (2-6)*
4. *One-on-one learning with teacher*
5. *Lecture format with the teacher or outside expert at centre stage*
6. *Project-based learning*
7. *Technology- based learning with mobile computers*
8. *Distance learning*
9. *Research via the Internet with wireless networking*
10. *Student presentations*
11. *Performance and music-based learning*
12. *Seminar-style instruction*
13. *Community service learning*
14. *Naturalist learning*
15. *Social/emotional learning*
16. *Art-based learning*
17. *Storytelling (floor seating)*

18. *Learning by building-hands on learning"* (Nair & Fielding, 2007, pp. 19-20).

In another instance, the American Architectural Foundation, in partnership with other firms, has developed some strategies for designing school buildings in the USA:

- Make it flexible and innovative.
- Engage the community in the design.
- Good natural lighting, ventilation, and acoustic systems make healthy school designs.
- Design secure and safe schools.
- Use technology in every aspect in learning environments.
- Design the building in such a way that it can teach itself, as 3D textbook. For example, designing an exposed structural system that encourages students to think and learn about buildings, or create an outdoor learning space for natural studies.
- Design small spaces that give more attention to individuals.
- Provide outdoor learning spaces.
- The school should serve the community needs as a centre for the community (American Architectural Foundation, 2006).

Although the criteria in the two examples above, and possibly other criteria in other countries, share some points, there is no record of an attempt to create a universal model or set of criteria for designing schools and learning environments.

Moreover, some theories about the ideal school were presented in Walker Art Centre galleries, in the USA, by discussing the impact of architecture on school environments. There are some factors that affect the nature of education today: education does not take place in schools only, formal classrooms are disappearing, and the

exciting technological innovations open numerous avenues for different learning processes. These factors make schools places for social meetings in addition to their educational purposes (Hardy Holzman Pfeiffer Associates, 1974).

4.3.2 CONCEPTS IN DESIGNING FOR CHILDREN.

Based on various criteria for designing learning environments, designers and educators offer some suggestions for design ideas. In designing learning environments, designs could depend on two or more issues: physical elements and activities in classrooms.

HUMAN SENSES:

In terms of physical elements, children find the world stimulating, exciting, and challenging. They use their senses to discover this new world. In addition to the five senses – sight, touch, hearing, smell, and taste – Day & Midjber (2007), claim that some scientists add three more, which are movement, balance, and warmth. These senses provide information about the space or surroundings. In addition to seeing the boundaries of a space, hearing could add more qualitative description about materials, whether they are hard or soft, for example. Colours, temperature, and sometimes textures, give the feeling of warmth or cold in spaces. For example, warm-coloured spaces feel warmer than cold-coloured ones. Therefore, children's spaces should be stimulating all children's senses in the right ways. The following is brief description of how each sense can be stimulated in children's environments (Day & Midjber, 2007).

Smell. According to Day and Midjber, smells, as well as other senses, affect our moods. Although few settings are usually designed to smell, all buildings and interior spaces do. Furniture and finishing materials have specific odours, such as fresh paint,

unsealed wood, or a synthetic carpet. In some spaces, cleaning materials dominate the environment's smells. However, in children's spaces, unpleasant smells are usually a health warning. Therefore, eco-friendly schools are committed to using natural and eco-friendly materials, such as natural paints and cleaning products (Day & Midjber, 2007).

Touch. For children, touch is the most important sense for learning about the world. Nevertheless, multiple materials may stimulate the senses, or they could be confusing. In children's spaces, it is important to deal with elements that children are in physical contact with, such as floors and lower wall surfaces. For example, wooden handles are more "hand friendly" to children than aluminium ones, and soft floors are preferable to hard ones (Day & Midjber, 2007).

Warmth. In terms of warmth, natural materials adapt to environments to give warmth or to cool the space. In contrast, industrial materials do not do so. For example, steel handrails are cold in shadow or burn in the sun. In contrast, wooden handrails are hand-warm all the time (Day & Midjber, 2007).

Sound. Children usually enjoy places with special sound effects, such as tunnels, caves, or echoing walls. Moreover, shapes and sizes of spaces have effects on sounds. Furnishing also affects the sound sense. For example, soft furnishing spaces are more sound-comfortable than hard ones. Sound sometimes becomes noise, whether it is from outside or inside the space. Therefore, in learning spaces, sound should be controlled, whether it is noise or not (Day & Midjber, 2007).

Sight. Sight sense allows us to perceive colours and shapes. Children recognise colours before their eyes can recognise shapes.

Furthermore, colours have a greater effect on females than on males. Designing for sight sense involves dealing with colours as the emotional factor and shapes as the active movement factor (Day & Midjber, 2007).

Balance. Children need their balance to be developed and constantly challenged, for example, by climbing walls or trees, in addition to equipment such as trampolines and stilts. According to Day and Midjber (2007), bodily-balance practice supports mental and moral balance.

Movement. This sense starts with children as they copy other movements, including those of living creatures and machines. Moreover, movement sense helps children to discover boundaries, bring seemingly unrelated items to relationships, and explore their surroundings (Day & Midjber, 2007).

LEARNING ACTIVITIES:

In addition to meeting sensory needs, designers can develop a design concept from analyzing activities in learning environments. One example of this is called GROUP TEACHING CONCEPT which aims to suit the variety of children's minds. Each child has a distinctive way of learning and expressing themselves. Translating that into a learning environment produces a theme in designing schools. The learning process in this concept occurs within three categories: large group instruction, small group work or discussion, and individual learning. Accordingly, open plans and wall-free rooms are being designed in three clusters for different-aged groups. Each cluster has its own facilities, instructional materials centre, televisions, and computers. Fixed furniture, changes in floor levels and different finishing materials act as partitions inside a cluster. All the clusters share a large open area for the group

activities and administration. This theme in design helps children in the learning process. In terms of spatial design, there are no corridors; all spaces are used for learning purposes. In addition, this kind of design gives the opportunity for future expansion (Hardy Holzman Pfeiffer Associates, 1974).

Fisher (2005) explains the group teaching concept in another way of achieving better learning environments. He limits activities in classrooms to five: delivering, applying, creating, communicating, and decision making. Each activity has its own characteristics that make it easy to apply as a spatial icon. Fisher also suggests multi-mode learning for designing learning environments using these five activities:

- The individual settings: spaces support individuals and self-directed learning.
- Group settings: spaces support groups and collaborative learning. They should have movable furniture for multi-spatial organization. It may be for small groups or larger ones for presentations and exhibitions.
- Activity-rich settings: spaces that support activities. They should contain a range of services and technological systems.
- Informal learning settings: spaces support informal learning. These are similar to group settings; however, they could be anytime and anywhere.
- Staff settings: spaces support activities for staff to take time out. They should not be isolated from students (Fisher, 2005).

Conclusion

In conclusion, some concepts (human senses, in particular) support the MI theory in many ways. Each sense suggests activities that are recommended in MI theory. For example, movement sense proposes

66

that it is important to create a space with movement challenges and suggests that these challenges also affect the children's mental performance. The MI theory, through the bodily-kinaesthetic intelligence, supports these kinds of activities. As a result, the use of human senses in designing spaces may help in applying the MI theory to the classroom interiors.

This chapter also reveals the importance of involving children in designing their environments. In this thesis, this concept is further explored through the research design, which includes surveying young students and teachers and finding out their opinions about their classrooms. More information about involving children in research is discussed in Chapter 6.

Furthermore, most studies and standards are for the school as a whole. There are presently very few criteria or design guides for the classroom interior design. Designing the interior or a space is not given a great deal of consideration in designing buildings. Moreover, these standards are not unified around the world. Each country (sometimes state or region) has different criteria in designing schools and learning environments. New Zealand, as well, has its own character in designing schools. Chapter 5 discusses the educational system and learning environments in New Zealand.

CHAPTER 5: NEW ZEALAND LEARNING ENVIRONMENTS

In Chapter 4, a range of theories for designing for children from different countries was considered. However, because this study is focused on New Zealand primary schools, it is important to understand the New Zealand school environment: the education system, school buildings, and teaching methods.

This chapter includes five sections. The first section focuses on the history of New Zealand's educational system and schools. The second section provides information about the Tomorrow's Schools system. It explains the roles of both the Ministry of Education and New Zealand schools in managing schools and schooling. The third section focuses on schools and types of schools in New Zealand. It includes information about the use of the MI theory in New Zealand schools. The fourth section outlines the designing of New Zealand learning environments and classrooms. Finally, research on New Zealand schools and classroom environments is reviewed.

5.1 HISTORICAL BACKGROUND TO NEW ZEALAND SCHOOLS

In 1814, New Zealand primary education history began when the Church Missionary Society (CMS), the first European arrivals to New Zealand who formalized an interest in education, started their mission in education. They modified educational ideas and techniques in order to create a **"CIVILIZATION CHRISTIAN MAORI SOCIETY."** Before missionaries, Maori education had focussed mainly on the schooling of older students and adults. Through creating infant schools, missionaries had a vantage point in redirecting the behaviour of young Maori children. In 1814, the focus was to involve formal schools for young children. CMS established a fund for schools, in addition to the help of other societies. These schools were mainly for students aged six to ten.

In these schools, children who had a little knowledge could teach other children who knew less. Several New Zealand missionaries were monitors in these schools. One master or a teacher could be in control of a hundred-student class with the help of monitors (May, 2005).

In 1823, Marianne Williams arrived in New Zealand. She was directed to lead the education of female children and the general improvement of women's education in New Zealand. Williams started by boarding Maori girls in her home. The girls helped with childcare and domestic works. The aim was to train Maori girls to be domestic servants. This action, releasing girls for classes, was the beginning of separate girls' schools (May, 2005).

In 1877, schooling became compulsory for Pakeha children aged seven and over who lived near a school (May, 2005). Beginning in 1878, education became controlled by three parties. The first was the Department of Education. The second was the Educational Board, which was responsible for tasks, such as establishing new schools, appointing and removing teachers, and approving schools' inspections. The third party was the school committees, each containing seven members, elected annually. School committees were responsible for managing educational matters in schools, in addition to making recommendations to Educational Boards regarding teachers (Knudson, 2006).

During World War I (1914-1918), the New Zealand education system went through a period of stagnation and inactivity. By 1920, after the war, New Zealand was experiencing a period of economic downturn that affected education in many aspects. Salaries of education employees were reduced. New school projects were cancelled. After World War II (1945), a population explosion presented a major challenge for the New Zealand education system. By 1951, the number of students aged five to nine increased from 58,886 to 240,583.

Therefore, the need for new classrooms and teachers was urgent (Knudson, 2006).

The majority of New Zealand school buildings were built after World War II, in the 1950s and 1960s. Classrooms were designed for the traditional teaching methods, where the teacher stands in front of students seated in rows of desks. Most schools are designed in a linear style, where classrooms are placed next to each other, along a long corridor. In the 1970s, the open plan design was introduced to school buildings. It was not very successful, as some teachers did not like this style (Sheerin, 2009). In 1998, the New Zealand Government introduced the **"TOMORROW'S SCHOOLS"** system (McLachlan, 2002). Currently, the educational system in New Zealand remains under the Tomorrow's Schools System.

5.2 TOMORROW'S SCHOOLS AND THE NEW SCHOOLING SYSTEM

The philosophies behind Tomorrow's Schools were first promoted in 1988 by the Minister of Education, David Lange. In 1990, the Tomorrow's Schools movement became The Education Act 1990. The Act requested the governing of the schools, including Board of Trustees, schools property, and school budgets (Sexton, 1990). The responsibility was transferred from Education Boards to the Board of Trustees (Sheerin, 2009). Members of each School's Board of Trustees included five to seven elected parents. The school principal, a staff member, and sometimes students, have the right to vote (O'Rourke, 1992). The role of the Ministry of Education (MoE) was reduced. The MoE provides a framework and budget for each school's Board of Trustees. This structure requires the school staff and community take the responsibilities of designing the curriculum and renovating and maintaining the school buildings (Geoffrey, 1997). In summary, operating and managing schools is shared between schools' boards of

trustees and the New Zealand Ministry of Education. The Ministry acts as the owner of schools and the schools' boards of trustees are the administrators (O'Rourke, 1992).

For example, a school budget, which includes the cost of actions such as capital work and maintenance, is funded by The Ministry of Education (O'Rourke, 1992). Each school is given a budget every five years for building maintenance and modernization. Schools can spend the funds on whatever they need or want (Sheerin, 2009). The Boards of Trustees are responsible for budget control, policy development, and property management. However, both the Ministry and the boards share responsibilities. According to the 1990 Education Act, the Ministry of Education's chief executive has the right to specify some terms and conditions for using and maintaining the property. This includes some standards for maintenance, minimum safety, and health requirements. On the other hand, schools and their Boards of Trustees take the responsibility for applying these standards in school buildings (O'Rourke, 1992). Sheerin (2009) assumes that according to this change, many schools changed the open plan design back to the standard or traditional design. Bruce Sheerin, Senior Policy Analyst in Ministry of Education, considers that the reason for this change was that most teachers were taught in the traditional classrooms, and they feel comfortable in teaching in similar spaces (Sheerin, 2009).

School principals take the responsibility for appointing teachers and the school support staff. Their role includes school management, professional leadership, educational leadership, and staff development. Therefore, a school Board of Trustees needs to work with the principal to create a school that functions effectively. In terms of curriculum development, the Ministry of Education is responsible for creating and implementing national curriculum objectives and frameworks for New Zealand schools. Within these objectives and guidelines, schools and teachers decide the details of their school

curriculum. This takes into account developing teaching strategies and assessment methods (O'Rourke, 1992).

Sue McLachlan (2002), associate principal at Mountain View primary school in south Auckland, commented on the Tomorrow's Schools system. Under the Tomorrow's Schools System, McLachlan considered that schools can choose their architect and/or designer for the school capital work and renovations. This can lead to unsatisfactory results. Some architects may not plan and design exactly as they have been instructed. Some schools have no idea, or unclear ideas, for the future design. Some unfamiliar architectural terms or details may create barriers. Also, low budgets may lead to unsuccessful designs" (McLachlan, 2002 P. 53). However, in 1989, **"The Impact of Tomorrow's Schools in Primary Schools and Intermediates,"** a survey report, mentioned that most Boards of Trustees did not notice changes in classrooms of their schools (Wylie, 1990).

5.3 New Zealand Schools
5.3.1 State schools.

State schools form the majority of New Zealand's schools. These schools receive funds from the government and follow the national curriculum. State schools are at primary, intermediate, middle, or secondary levels. Both girls and boys are accepted in primary and intermediate schools, whilst some secondary schools offer single-sex education (Ministry of Education, 2009 a).

Primary schools accept children from ages five to thirteen and are divided into three types. The first one is a full primary school, which includes years one to eight. The second type is a contributing school that teaches years one to six. The third type is an intermediate school that teaches years seven and eight. All primary schools are included in the compulsory education system in New Zealand (Ministry of

Education, 2009 a). There are 55 primary schools in Wellington City. Most of these are full primary schools (Wellington Schools 2010, 2010).

Decile rating:

New Zealand schools are assigned a **"DECILE RATING."** This rating indicates the socio-economic background of the students' families. There are ten decile ratings. Decile 1 represents the highest proportion from low socio-economic backgrounds, whereas Decile 10 indicates the highest proportion of high socio-economic backgrounds. Government funding varies according to Decile ratings, such that lower decile schools receive higher funding. This increase in funds is to provide additional resources to support students' learning needs in low decile rating schools (Ministry of Education, 2009 a).

5.3.2 MAORI IMMERSION SCHOOLS.

There are two categories of Maori immersion schools: Kura Kaupapa Maori and Kura Teina. A Kura Teina is a project by a community who want this project to become a Kura Kaupapa Maori. A Kura Kaupapa Maori is a state school where students are taught in the Maori language and the goals and principles reflect the Maori philosophy and practice (Ministry of Education, 2009 b). These schools offer mainly primary education levels (Smith, 1991 b). The curriculum in Maori Schools focuses on Maori learning styles and administrative practices (Gardiner, 1993).

In terms of maintaining Kura Kaupapa Maori, a theory called **"THEORY OF CHANGE"** has emerged from the Maori community to support Maori schools and Maori education. This theory, interestingly, does not reject Pakeha (the name for cultures other than Maori) knowledge or culture.

Instead, it encourages excellence within Pakeha, as well as Maori culture and language (Smith, 1991 a).

The philosophy that Maori schools adopt considers six key elements. The first is for Maori to have control over their own lives. This is represented by reflecting Maori cultural, political, economic, and social preferences in schools and schooling. Second, the education settings in such schools should support Maori language, knowledge, and values. Third, teaching and learning settings should be effectively connected to cultural backgrounds and Maori life circumstances. Fourth, Maori schools should engage the power of Maori culture through its emotional and spiritual elements in challenging socio-economic and home difficulties. The fifth aspect is to emphasize the cultural structure of cooperative work, rather than the individual, to create one big family. Finally, a good Maori education should encourage students to share and cooperate to attain excellence in Maori. Moreover, it should motivate them to participate at every level in modern New Zealand society (Smith, 2003). According to Gardiner (1993), research indicates that the Maori and similar programs help not only students, but also their families and communities, and benefit the country as a whole. Furthermore, Maori schools are the only place for many students that represents their culture and promotes the Maori language as the first language (Gardiner, 1993).The number of Maori immersion schools nationwide has increased from 13 in 1992 to 73 schools in 2009 (Ministry of Education, 2009 b).

5.3.3 Other school types in New Zealand.

New Zealand also has private schools. These schools charge fees, have their own independent boards, and do not have to follow the national curriculum. However, they receive some funding from the government. They must meet specific standards to be registered within The Ministry of Education (Ministry of Education, 2009 a).

Alternatively, schools can be state integrated. These schools used to be private schools, but now they are included in the state system. They receive some funds from the government but also charge fees because they own their buildings and the land. These schools follow their own character in teaching, which usually represents a philosophy or religious belief, but within the national curriculum framework (Ministry of Education, 2009 a). A good example of this type is a Montessori School. The Montessori learning materials enable the student to literally see and explore abstract concepts (Montessori Aotearoa New Zealand, 2009). Montessori education involves using multi-age classes, a special set of educational materials, student-chosen work in long time blocks, collaboration, the absence of tests and grades, and individual or small group instructing (Lillard & Else-Quest, 2006).

Another example is the Steiner School. Steiner education is designed to meet the changing needs of children as they develop physically, mentally, and emotionally (Lewis, 2001). It involves academic, artistic, and social aspects (Hale & MacLean, 2004). According to the Steiner concept of education, children up to the age of seven should be encouraged to play, draw, story-tell, and be at home in nature. Therefore, children should not be taught how to read before seven years of age. Moreover, writing should be introduced to children before reading. Science and art should be connected in teaching (Lewis, 2001).

5.4 Multiple Intelligences in New Zealand

The use of the MI theory in New Zealand can be divided into three parts in schools and teaching, in universities, and in academic research.

Although the MI theory has received criticism, it is used extensively throughout New Zealand schools (Evans, 2007). Waipahihi Primary School considers the theory in senior, years 5 and 6, classroom

programs. Teachers and students in these classrooms understand the theory and use it during class-time (Waipahihi School, 2003). In Rangiora High School, two of the principles of the school are to increase the awareness of multiple intelligences theory and display the theory in classrooms in order to reach a visible curriculum (Hays, 2008). Pinehurst primary school, Albany, Auckland is another school that incorporates the MI theory in its curriculum. This school employs a variety of other teaching strategies and philosophies (Pinehurst Primary School, 2010).

In 2006 and 2007, self-awareness of learning, which includes learning styles, such as multiple intelligences, was introduced to more than a quarter of secondary and primary schools in New Zealand. Figure 5-1 and 5-2 provide findings from the NEW ZEALAND COUNCIL FOR EDUCATIONAL RESEARCH (NZCER) secondary 2006 and primary 2007 national surveys. These graphs describe the different percentages of teachers' and principals who have considered using different learning styles, which includes MI approaches. About half of New Zealand primary school teachers and principals use different learning styles, whilst 34% are considering their use. The remaining percentages represent the minority who have not considered them, would not use them, or did not respond to the survey. The situation is similar in secondary schools. The majority of teachers, 48%, and principals, 54%, employ different learning styles in classrooms. Smaller percentages of teachers (34%) and principals (26%) are considering the use of different styles in teaching. As in primary schools, the smallest percentages represent teachers and principals who have not thought about these styles, would not use them, or did not respond to the survey (Schagen & Hipkins, 2008).
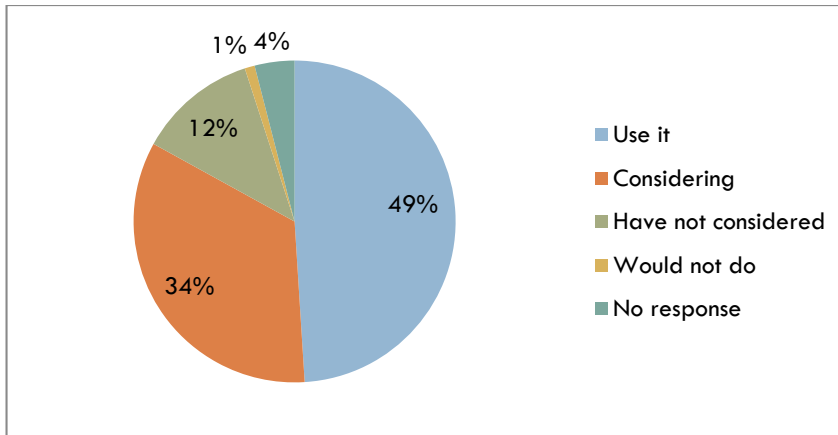
FIGURE 5-1. THE PRIMARY TEACHERS' USE OF DIFFERENT LEARNING STYLES. MULTIPLE INTELLIGENCES APPROACHES OF TEACHERS AND PRINCIPALS OF PRIMARY AND SECONDARY SCHOOLS IN NEW ZEALAND IN 2006 & 2007ADAPTED FROM SCHAGEN, S. & HIPKINS, R. (2008)., P10, 14, 22, 28.
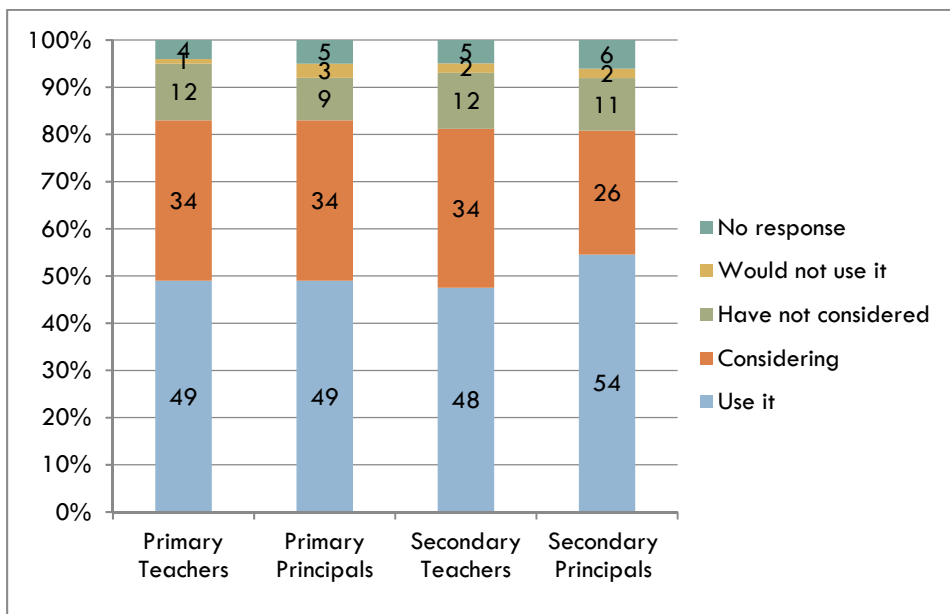
FIGURE 5-2. THE DIFFERENCES IN USING DIFFERENT LEARNING STYLES IN PRIMARY AND SECONDARY SCHOOLS/ MULTIPLE INTELLIGENCES APPROACHES OF TEACHERS AND PRINCIPALS OF PRIMARY AND SECONDARY SCHOOLS IN NEW ZEALAND IN 2006 & 2007. ADAPTED FROM SCHAGEN, S. & HIPKINS, R. (2008)., P10, 14, 22, 28. (THE FIRST COLUMN OF THIS GRAPH REPRESENTS THE SAME DATA IN FIGURE 5-1 BUT COMPARES TO OTHER DATA).

In terms of universities, the University of Canterbury in Christchurch, New Zealand, offered a course about Gardner's theory in 2008. This

course, titled **"Multiple Intelligences in The Classroom,"** discusses the eight intelligences and their implications in the key learning areas of the New Zealand curriculum. It aims to make participants of the course able to apply the MI approaches to achieve the national curriculum goals. It encourages teachers to devise lessons that give students the opportunities to develop their various intelligences (University of Canterbury). Another course is being offered at Business School, The University of Auckland, called **"Wise Choices- How to Make the Right Decisions."** This course includes a section about **"Identifying Multiple Intelligences."** Unlike the first course, this one is oriented toward managers, supervisors, and team leaders. It provides a number of techniques to make decisions wisely (Business School, The University of Auckland, 2010).

"Implementing the Theory of Multiple Intelligences in the Junior Secondary School" is a master's thesis by Mennie Scapens in the Education School at The University of Waikato in New Zealand about the multiple intelligences theory. This thesis discusses teaching and learning under the MI theory in junior secondary schools. It provides some information about the theory in general, in addition to four case studies in New Zealand schools, explained in detail. However, this thesis does not discuss any terms of the classroom design (Scapens, 2007). Moreover, Dr Helen Sword, senior lecturer and head of academic practice group in the Centre for Academic Development in The University of Auckland, is interested in the MI theory. In 2007, Sword wrote an article about the MI theory, **"Teaching in Colour: Multiple Intelligences in the Literature Classroom."** She discussed Gardner's theory and explained the eight intelligences. In addition, Dr Sword gave various examples of applying the MI in teaching methods and its effects on students' productivity (Sword, 2007). In July-2010, Christchurch, the researcher attended a workshop **"Multiple Intelligences in your Classroom"** coordinated by House of Montrose Education Consultants. The aim of the workshop was to offer

78

educators insights about MI theory to support equitable and quality learning in schools. The outcomes of the workshop were mainly about teaching and communicating strategies. As the researcher was the only participant with interior design aims, there was only a small discussion about the researcher's thesis and implications of classroom settings that the researcher proposed.

5.5 SCHOOL LEARNING ENVIRONMENTS AND DESIGNS

The majority of New Zealand school buildings were constructed in the 1950s and 1960s. They were designed in a linear style where students sit in desks in rows. Sheerin (2009) claims that these schools lack flexibility. Although New Zealand learning and teaching have changed extensively in the last 40 years, many new and rebuilt classrooms are designed in the old styles. Sheerin argues that many teachers consider that "flexibility" can mean a larger box rather than a different box. Sheerin also assumes that different learning environments may lead to better learning and teaching (Sheerin, 2009).

Sheerin asserts that even though many schools tried to change during their construction, they stayed within the old style borders. For example, in most schools, computers are still in the computer room or lab; rather than in the classroom. Some problems have come to light after the 1998 policy, such as the noise, overheating, and glare (Sheerin, 2009).

Most relevant studies focus on acoustics, air quality, natural lighting and maintenance. No research, however, discusses the impact of learning spaces on the learning outcome. Currently, the Ministry of Education is trying to encourage schools to modernize their classrooms by targeting the learning environments. Although the learning environment has a 20% impact on the learning process, there is no work or study on the

interior environment of the classroom and the furniture layout in New Zealand schools (Sheerin, 2009).

The Ministry of Education has provided a series of guidelines for schools and Boards of Trustees. The aims of these guidelines are to evaluate the existing performance of a learning space, to be aware of characteristics of good learning spaces, and to reach the highest possible quality in designing school spaces. The guidelines include acoustics; air quality and ventilation; heating and insulation; lighting; and interior design guidelines that discuss some examples and provide information about the classroom shape and size, colours, physical needs, and internal layout (BRANZ, 2009).

5.6 PREVIOUS STUDIES ON NEW ZEALAND LEARNING ENVIRONMENTS

There are a number of studies conducted on New Zealand school buildings and classrooms. The three that will be discussed in more detail in the subsequent sections are: **"CLASSROOM ACOUSTICS: MILESTONE 6 REPORT"** by J Whitlock and George Dodd; **"SUNSHADE DESIGN IN NEW ZEALAND PRIMARY SCHOOLS"** by Christina Mackay; and **"DEVELOPMENT OF FURNITURE SYSTEM TO MATCH STUDENTS NEEDS IN NEW ZEALAND SCHOOLS"** by P. J. Kane, M. Pilcher, and S. J. Legg.

The **"CLASSROOM ACOUSTICS: MILESTONE 6 REPORT"** confirms that children display the Lombard effect[7] in the presence of background noise, and that they have a lower integration time of speech compared to adults. The authors claim that, as the traditional teaching styles in classrooms changed over time and were replaced by a group work approach, the noise level has increased dramatically, highlighting the

---

[7] Lombard effect is a psycho-acoustical phenomenon, used by United States researchers, that causes the speaker to experience difficulty in maintaining their speech and/or to raise their voice level accordingly (Whitlock & Dodd, 2004).

need for the improvement in classroom acoustics. Furthermore, a low Reverberation Time (0.4 seconds) for classrooms is recommended in order to reduce undesirable sound energy (Whitlock & Dodd, 2004).

The **"SUNSHADE DESIGN IN NEW ZEALAND PRIMARY SCHOOLS"** project identifies the best practice in sun shade design in New Zealand primary schools. This project studies 29 types of shades in 10 primary schools in New Zealand in terms of their use and effectiveness in providing ultra violet radiation (UVR) protection. The results of the project reveal six types of sun shades that include: classroom veranda; well established trees; and shade over junior court, play equipment, and sand-pits. The author claims that the best features for sun shade design combine the appropriate building and exterior design with natural shading materials (Mackay, 2003).

The **"DEVELOPMENT OF FURNITURE SYSTEM TO MATCH STUDENTS NEEDS IN NEW ZEALAND SCHOOLS"** study aims to solve the problem of the mismatch between the dimensions of school furniture and 5-17 year old student's body size. It focuses on creating dynamic chairs, desks, and storage units for classrooms. The study describes the development of the chair height band system of sizing that can accommodate different student sizes. This development is a major improvement over the traditional practice of sizing by year level alone. The chairs and desks designed as a part of this study have been in use in some New Zealand schools since February 2005 (Kane, Pilcher, & Legg, 2006).

Conclusions:

At present, no studies are being conducted on the interior design of classrooms in New Zealand. In addition to the changing responsibilities for designing schools following the introduction of the Tomorrow Schools System, the lack of classroom design studies may result in low levels of awareness amongst school officials about the importance of good

classroom designs. Consequently, teachers and school principals may not be able to create a good learning environment for their students because they are not aware of the recommendations for the most appropriate educational setting designs. There is a clear and urgent need to educate all involved in child education on most effective classroom designs that would foster, rather than impede students' learning process.

The MI theory is introduced and used in many schools in New Zealand and it became a focus for many researchers in this country. The present study could, thus, introduce schools to the importance of classroom designs. The first step is studying and analyzing the existing New Zealand classrooms in relation to the MI theory. The next chapter presents the chosen methodology – a case study research – employed for studying New Zealand primary schools according to MI theory.

CHAPTER 6: RESEARCH DESIGN

The literature review, described above, revealed important observations. The MI theory has become an educational philosophy with a psychological background. Teachers around the world very often discuss it in their strategies. Although the links between this theory and the design of learning environments are few, the necessity of suitable learning environments design still exists. Around the world, learning spaces are being designed with different criteria. Some support the MI theory indirectly and others do not. One aim of this study is to examine New Zealand learning environments. To complete this task, preparations and design are needed. This chapter outlines the methodology to study New Zealand classrooms and to connect them with the MI theory. The main target of this chapter is to describe strategies and techniques used to complete the data collection and analysis.

This chapter is divided into six sections. The first section describes the case-study methodology as the chosen methodology for this research. This section gives general information about case-study methodology in addition to the case-study protocol used in this research. The second section discusses the research question and the conditions that led the researcher to it. The third section gives an outline about the study proposition, and describes the eight intelligences in terms of design settings. The fourth section describes the chosen strategies for selecting each of the case-study 'units'. The units in this research are Wellington primary classrooms, primary school students, and primary school teachers. The fifth section provides six possible sources of evidence. In this section, three sources are chosen: interviews, direct observation, and physical artefacts. The section describes each of the three sources and provides techniques to undertake the research. It also explains special criteria for researching with children. The final section gives some criteria for analysing the collected data. It explains the selected

83

strategy in analysing this research data and gives some rules for producing better analysis. The ethics committee in Victoria University has approved this research project. See Appendix A for the ethical approval form.

6.1 A MULTIPLE CASE STUDY RESEARCH

Case study is one of many different methods of conducting social-science research. According to Yin (1994), case studies are the preferred method when the study question begins with 'how' or 'why,' when the researcher has little or no control over events, and when the focus is on contemporary events. Through its cases, case-study research can provide little basis for scientific generalization. This generalization is not to the universe or population, but to its theoretical propositions. Therefore, the case study does not represent a sample. The goal of case study research is to expand or generalize theories, not to prove statistical facts (Yin, 1994). This study could be completed using a survey or a case study methodology. However, due to the scope of the study and time limitations, it was hard to cover a representative sample of New Zealand primary schools in a survey.

Case-study research may involve single or multiple cases. In multiple case studies, there are five levels of investigations:

- Questions about specific interviewees.
- Questions about the individual case.
- Information about the findings across multiple cases.
- Information about the study including literature review and the multiple cases.
- Normative information for the conclusion (Yin, 1994).

Case study research needs three stages to be completed. The first stage is designing the case study protocol (Figure 6-1). The case study

protocol of this research is discussed later in this chapter. The second stage is conducting a pilot case study. Pilot case studies are also a vital step in case study research, as they help refine the case study design (Yin, 1994). Pilot studies can represent the most complicated cases or the most flexible within the actual cases. Investigators need to write reports from pilot case studies, as well as the actual cases. The difference is that the pilot report should explain lessons learned from research design and field procedure (Yin, 1994).

 In this research, the pilot case study is considered as an actual case study because there are no major changes to the case study design after the pilot case study. The third stage is conducting the actual case studies.
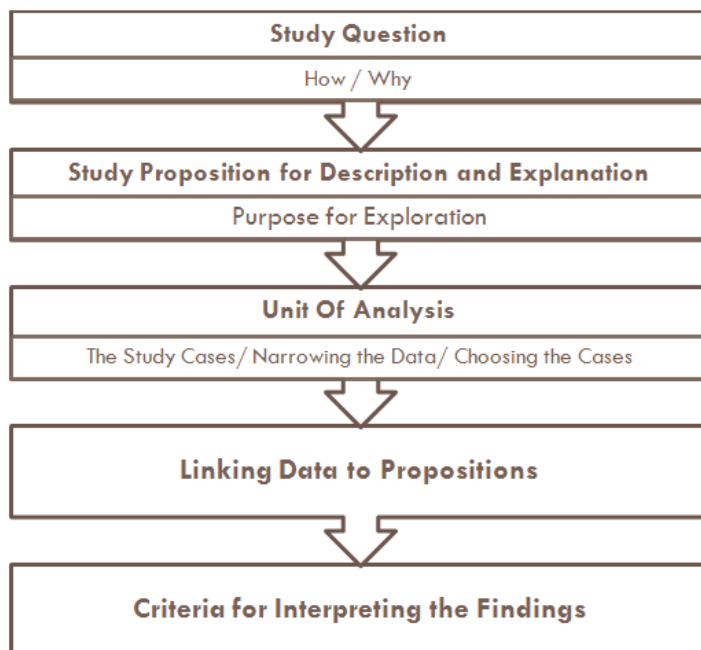
FIGURE 6-1. CASE STUDY PROTOCOL. ADAPTED FROM YIN, 1994, P 20-26.

6.2 STUDY QUESTION

The study question is the first component in the case study protocol. As mentioned in the Introduction chapter, the aim of this research is to conduct a study on the interior design of primary classroom in New Zealand in relation to the MI theory. The main question in achieving this aim is **How do New Zealand primary school classroom settings function in relation to the Multiple Intelligences theory?** This question determines the framework for the case studies starting with the study proposition in the next section.

6.3 STUDY PROPOSITION

According to the study question, this study is looking for a relationship between New Zealand primary classroom settings and the MI theory. Therefore, the researcher proposes a group of classroom settings that support the MI theory. The reason for these settings is to have standard modules for classroom settings in order to enable the comparison with the existing settings. In Table 6-1, the suggested settings are divided by the researcher, according to the MI theory eight intelligences. Each group of settings serves at least one of the theory intelligences. The researcher transforms the MI theory and creates settings depending on information from Chapters 2, 3, and 4, and the researcher's personal analysis. In Table 6-1, each intelligence is supported by the activities that could be related to it, in addition to what activities need to be completed by participants. As a result, a list of classroom settings is created for each type of intelligence.

6.4 UNITS OF ANALYSIS

After setting the proposition, the units involved in the study need to be selected. The units in this case study are the primary school classrooms in New Zealand. Since the current study is being held in Wellington

TABLE 6-1: *THE PROPOSITION OF THIS RESEARCH: MI SETTINGS, DEVELOPED FROM INFORMATION IN CHAPTERS 2, 3, AND 4.*

The eight MI theory intelligences	Possible activities	Students may need	Teachers may need	Tools	Possible design settings	Special design requirements
Linguistic Intelligence (word smart)	Reading Writing Speaking Telling stories or poems Typing, printing, and listening	- Comfortable place for reading - Hard surfaces for writing - Space for computers and printers for publishing - Space for telling stories and giving speeches - Book display/storage.	Controlling centres where they can see, hear, and monitor all students in the classroom A computer connected to all other computers in the same room	Books Dictionary Writing tools Internet access Audio files Earphones Talking books Talking posters Language games and plastic letters	- Soft floor seating or couches supported with some cushions - Some tables and chairs for formal seating (it could be one large table with some chairs) - Computer tables supported by printers and writing software - Mini stage or special corner for telling stories and giving speeches - Book shelves and tool cabinets (could be sorted in alphabetical order) - Video audio system	Sound isolation materials and effective balance of sound reflection and absorption High quality day lighting and artificial lighting winter overcast weather
Logical-Mathematical Intelligence (number smart)	Calculating and solving problems Ordering Organizing Categorizing Computer programming Experimenting Analyzing and planning	- A quite place for thinking and solving problems - Hard surfaces for written work - A place for computers and technology where students can discover and invent - A place for science experiments - A place for discussing and sharing ideas and plans	A space for discussing topics and subjects A space to meet with students individually or in groups A white or black board for the daily schedule Some cabinets to store some tools away from students	Computer programs and software Graphs Time lines Internet access Experimental materials Calculators Black or white board for science discussion	- Nooks, wall niches, or window benches for private thinking - A round table for group discussion and written work - Computer centre supported by space for analysing and discovering technology (a counter for discovering how machines work – a radio or a mobile phone, for example) - A counter and some high chairs for science experiments supported by a water tap and cabinets for storing experimental tools - A place to display students' work and achievements	Water proof and easy to clean furniture and flooring High quality day lighting High quality ventilation system
Spatial Intelligence (picture smart)	Painting Drawing Creating Dealing with colours, lines, shapes, forms, and spaces Designing Visualizing and building	- Hard surfaces for drawing and painting - A centre for creating and producing artefacts - A place to display students' work - A place for taking and collecting photos - A space for free activities using colours, shapes, and building materials		Special puzzles Painting and drawing tools Art work Videos illustrated books Drawing and animation software Maps Graphs Three dimensional building materials Cameras	- An art area with tables and chairs (there could be one or two painting stands) - A round table for group creative work or individual work supported by a water tap (there could be a pottery wheel) - Cabinets for storing art tools and materials ordered in a colour or signs scheme - Photography corner with photo printer and computers supported with drawing and animation software - A building corner with movable, flexible, or buildable furniture. Building materials with wide range of colours and shapes	Water proof and easy to clean furniture and flooring
Musical Intelligence (music smart)	Listening Composing Playing with music instruments Dealing with rhythms, melodies tones, and sound patterns Whistling Tapping feet Reading notes	- A space for singing and performing - A space for an audience (the rest of the class who are not singing or performing) - A space for storing music files and instruments - Space for listening to music privately (using headphones) - Space for writing music notes		Sound files Headphones CD players or MP3 players Music sheets Music instruments Audio recorder Internet access Music books	- A large round table with CD players and headphones in the centre - A mini stage for singing and playing music for the class - Cushions and soft floor seating for the rest of students - Cabinets for music files and instruments - A table for writing and discussing music notes and lyrics - A group of buttons on a wall to give some	Sound isolation materials and effective balance of sound reflection and absorption

| The eight MI theory intelligences	Possible activities	Students may need	Teachers may need	Tools	Possible design settings	Special design requirements
		and lyrics			- sound effects and voices - Private nooks for private sound recording - Video audio system	
Bodily-Kinaesthetic Intelligence (body smart)	Dancing Sport playing Physical activities Running Jumping Building Gesturing Role playing Acting (drama)	- Large open spaces for creative movement - A space for creative hands and hand working - A space for performing, dancing, and role playing - A space for mini sport tools and equipments		Juggling equipment A mini trampoline Carpentry, blocks, and clay Samples of different textures Mini sport equipment and tools, such as a jumping rope or some weights	- A round table for creative hands, supported by some materials, such as clay and blocks - A large empty space inside the classroom with comfortable flooring (carpet for example) for free physical activities and creative movements - A mini stage for performing - A corner for sports with cabinets for storing sport tools - Different textures and materials applied to furniture and walls inside the classroom	Safe flooring and furniture for free movement
Interpersonal Intelligence (people smart)	Group working Gesturing Speaking Listening Networking Leading Manipulating Partying Interviewing Debating	- The main need is to be with other people to be able to express one's abilities. This could be whether they are standing or seating around a table or on comfortable floor seating		Internet access Voice recorder Maybe a video camera	- It could be achieved with almost all the settings mentioned above. It could be a mini stage, a round table, floor seating, or on couches	
Intrapersonal Intelligence (self smart)	Dealing with self abilities and controlling them Setting goals Dreaming Planning Discovering	- They may need a secret place where they can work alone		Internet access Any other tools that the student can use individually	- Study carrel - Loft with nooks for more privacy - Computer corner - It could also incorporate working with other people	
Naturalist Intelligence (nature smart)	Dealing with living creatures natural features, and patterns Dealing with objects from urban environments Discovering nature Raising animals Caring for the Earth	- Access to the nature - A place to discover living creatures and caring for them - A place for investigating about creatures, urban objects, and the Earth (does not involve handling real animals and plants)		A rabbit cage or an ant farm (any creature that does not make noise) Gardening tools Aquarium posters Wall hangings	- A counter with high chairs for discovering animals and plants - A round table for discussing and investigating living creatures and urban objects, supported with a computer - An access to the outdoors	Suitable environment for living creatures An outdoor space for nature discoveries

City, the units are selected within the Wellington City primary schools. According to a list from the New Zealand Ministry of Education, there are 55 state-primary schools in Wellington City, see Appendix B Wellington school list (Wellington Schools 2010, 2010). To reduce the study to a few schools, the variables in primary schools, which are decile rating and school year, are fixed. Decile rating is fixed by two methods. The first method is defining the average of Wellington primary schools decile ratings. By adding the decile rates of the 55 schools (446) then dividing the result by 55, the average of 8 is derived. The second method is defining the mode of Wellington primary schools decile rating. Twenty-two of the schools are 10 decile schools, which makes 10 the mode of the Wellington primary schools decile rating. The reason for choosing two methods for fixing the decile rating is that the researcher started with the average method, but only one school accepted the request to participate in this research and more schools were needed. So the mode method was used. However, only three schools out of 10 decile schools accepted the request. Therefore, units of analysis are classrooms from an 8 decile school, Clyde Quay School, and three 10 decile schools: Thorndon, Northland, and Roseneath. The other variable, the school year, is fixed to select the classroom to be studied from the four selected schools. One middle year classroom, year 5–6, is selected from each school.

The study also involves the classroom users in addition to the classrooms themselves. The classroom users are teachers and students. The teachers of the four classrooms are selected for the case study. As each participating classroom has one teacher, four primary school teachers were involved in the study. In terms of students, they are boys and girls aged 9–11 years old. Five students were selected from each classroom randomly. These results in units of analysis, which are: four primary classrooms from Wellington City, four primary school teachers, and twenty primary school students.

6.5 LINKING DATA TO PROPOSITION – COLLECTING DATA

According to Yin (1994), there are three principles for collecting data from units of analysis: using multiple sources of evidence; creating a case study database or a case study report; and creating links amongst the asked questions, collected data, and the conclusion. In the case study methodology, there are six possible sources of evidence: documentation, archival records, interviews, direct observation, participant observation, and physical artefacts. A good case study uses as many sources as possible (Yin, 1994) (Figure 6-2).

Three of these sources are chosen for collecting data in this research. The first source is interviews: personal interviews provide information about the users and their needs. It is important to analyse the relationship between the space and its user. The second source of evidence is direct observation. Being inside the classroom gave the researcher the opportunity to observe and notice some problems or ideas that teachers and students would not be able to, as they may not be experienced in interior architecture or design. The third source is physical artefacts evidence for analysing the physical environment.
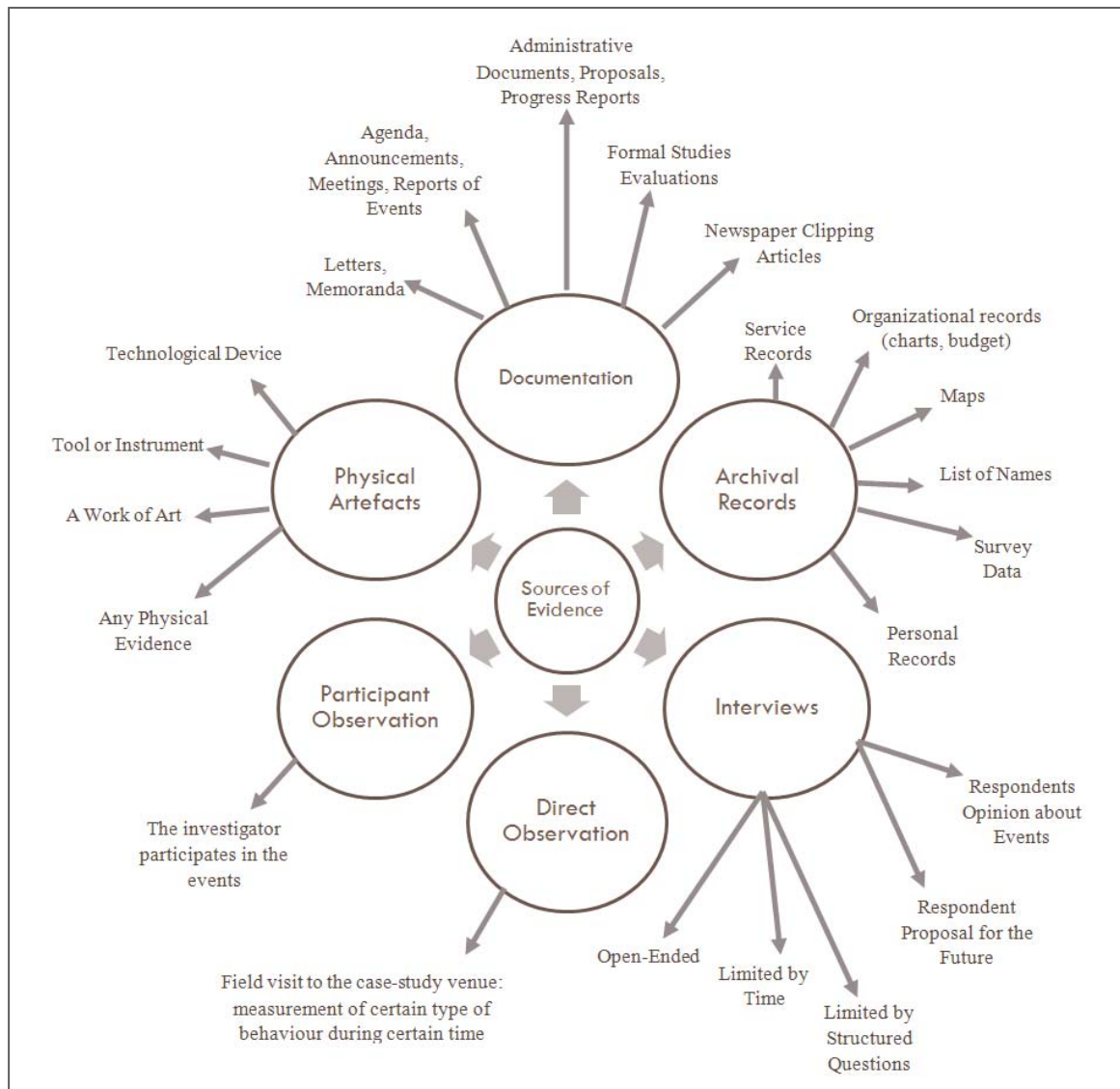
6-2. SOURCES OF EVIDENCE IN THE CASE STUDY RESEARCH. ADAPTED FROM YIN, 1994, P 81-90.

6.5.1 INTERVIEWS.

One of the sources of evidence used in this research is interviews with teachers and students. Questionnaires are another way of conducting interviews, as they can save time (Greig et al., 2007). However, students' interviews provide more information than a questionnaire. This is especially true in that children might not respond to the questionnaire

as required, whereas, teachers might respond better to questions in their questionnaire than students could do.

Students' interviews.

The aim of the students' interviews was to find out how they used the existing settings, how satisfied the children were with the existing settings in their learning environments, and how they envisaged the future classroom settings. Some questions are about furniture used inside classrooms, and others are about design elements and principles, such as colours, textures, and lighting.

As the target of these structured interviews are children, it is vital to respect certain considerations. According to Greig, Taylor, and MacKay (2007), two principles are recommended for interviewing primary school children: focus group discussion and individual interviews. Both methods use the same techniques (Figures 6-3 and 6-4).
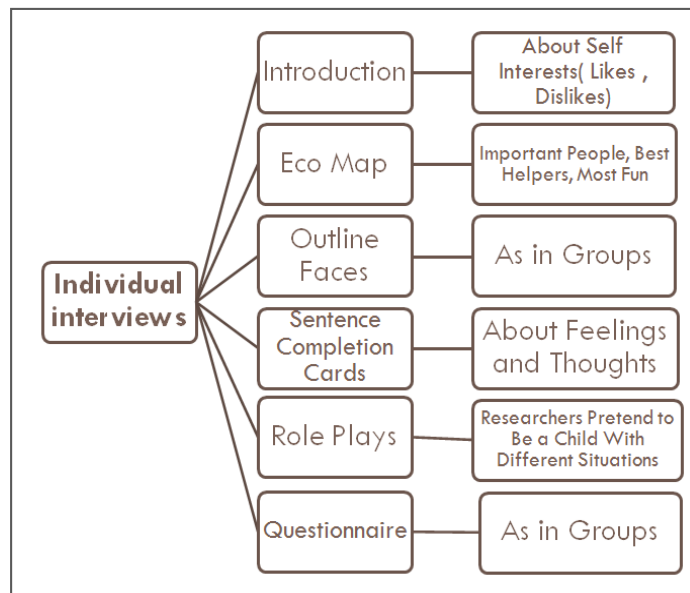
FIGURE 6.3. CHILDREN'S INDIVIDUAL INTERVIEWS. ADAPTED FROM GREIG ET AL., 2007, P. 163.
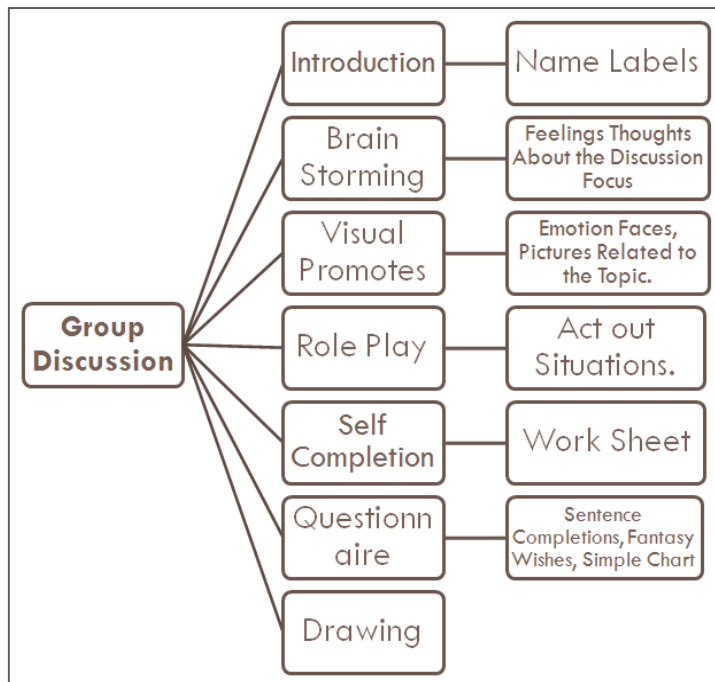
FIGURE 6-4. CHILDREN GROUP DISCUSSION ADAPTED FROM GREIG ET AL., 2007, P. 163.

During the interviews, the investigators are responsible for certain tasks. Firstly, they should choose the context wisely, such as schools, homes, or clinics. Secondly, investigators need to explain the purpose of these questions and interviews. Questions should be straightforward and open-ended. For consulting with children in expressing their thoughts or feelings, they need a scale, such as 1–5 or 1–10. According to Greig et al. (2007), using figures, such as happy or sad faces is highly recommended, as it makes it easier for children to choose which level suits their feelings or thoughts. Children's questionnaire or interview questions should include four types of questions: (a) Yes/ No questions; (b) Multiple choice questions; (c) Scalar questions (questions with a scale such as 1–5); and (d) open-ended questions. Several types of questions and children's responses are shown in Table 6-2. Thirdly, the questions and supporting materials should be designed according to the child's developmental and individual abilities. Finally, investigators have to assume that the person answering the questions does not know anything

about the topic. Children's responses could be influenced by the status of the interviewer and context (Greig et al., 2007).

Interviews could be supported with a drawing session. According to Greig et al. (2007), children's drawings are believed to show what is in a child's mind. The drawing can reveal the child's feelings and thoughts.

In this study, children's interviews were divided into group discussions and individual interviews and a drawing session.

The survey started with the researcher introducing herself, giving each participant a label for their name and age, and explaining the aim of the research (studying primary school classrooms). The brain storming session commenced by asking the students some questions about schools, school designs, classrooms, and how important the classroom is for the learning process. The questions in the focus group were not included in the Survey outcome. Their purpose was to encourage students to think about the topic and prepare them for the individual interviews.

Next, the researcher interviewed each student individually in a quiet room within the school[8], asking the student questions from the "Student Individual Interviews Form" (see appendix C) and filling in the form herself.

In the drawing session, the students were given some paper, pencils and colouring pens and were asked to draw what they would like their

---

[8] In Clyde Quay School, the survey was completed in the library. In Thorndon School, the interviews were completed in the classroom while the drawing session was completed in a vacant room just next to the classroom being studied (the classroom was vacant during the interviews). In Northland School, the survey was completed in the withdrawal room. In Roseneath School, the survey was completed in a vacant teacher's room.

classroom to look like in the future. The students were given 20-30 minutes to finish the drawings.

TABLE 6-2: TYPES OF QUESTIONS ACCORDING TO CHILDREN'S DIFFERENT AGES. ADAPTED FROM TAYLOR AND MACKAY, 2007, PP. 91–92)[9]

QUESTION	ABILITY	SUITABLE AGE
WHO? WHAT? WHERE?	IDENTIFYING PEOPLE, OBJECTS AND PLACES	FROM VERY YOUNG CHILDREN
WHY? WHEN? HOW?	1-UNDERSTANDING CAUSES AND EFFECTS	1- FROM TWO YEAR OLDS AND OVER
	2- BEING ABLE TO RESPOND TO QUESTIONS, SUCH AS WHY? WHEN? OR HOW?	2- STARTING FROM SCHOOL AGE
THE PAST, PRESENT, AND FUTURE	1- TALK ABOUT THE PAST AND PRESENT	1- PRESCHOOLERS AND OLDER
	2- BE ABLE TO USE PAST AND FUTURE TENSES	2- AROUND FOUR YEARS OLD AND OLDER
QUESTIONS RELYING ON MEMORY	BE ABLE TO ANSWER QUESTIONS USING THEIR MEMORY CAPACITY	THE END OF PRIMARY SCHOOL CHILDREN NEED SOME SUPPORT IN REMEMBERING
SENSITIVE QUESTIONS	THE ABILITY TO DISTINGUISH THE FACT FROM FANTASY, AND TRUTH FROM LIES	ABOUT THE AGE OF FOUR
REPORTING ON KNOWLEDGE AND BELIEFS	BE ABLE TO DEAL WITH OPEN QUESTIONS OR STATEMENTS	NURSERY AND EARLY PRIMARY STAGE CHILDREN TEND TO AGREE WITH THE INTERVIEWER

TEACHER'S QUESTIONNAIRE.

Teacher questionnaires aim to support the information from student's interviews. Almost all the questions from the student interview are repeated in the teacher questionnaire. In addition, questions about teacher settings and teacher special requirements are included. See Appendix C for students' individual interviews, group discussion schedule, and teacher's questionnaire forms.

---

9 The highlighted rows represent the types of questions used in student's survey.

6.5.2 DIRECT OBSERVATION.

For studying the efficiency of the classroom design and furniture layout, direct observation was conducted in each classroom. The author undertook all the observations spending a day in each classroom. The whole set of observations took a month. The day was selected to be a typical for each classroom. The observations aimed to explain the detailed links between the classroom and its settings with the classroom and users.

Rauterberg (2010) proposed that the aim of observations is usually to indicate the difficulties facing people in everyday living. Observations may suggest ideas for the future or discuss problems of the present activities. It is important to inform those being observed about the observation and its aim. Under direct observation, people usually perform better. The observer should be aware that better performance might affect the accuracy of the observation. Therefore, it is recommended that the observer should sit passively and allow time for the people being observed to become less aware of them. The observer should record the activities as accurately as possible (Rauterberg, 2010).

Observations could be structured, where it is recorded according to certain categories, or free-form. In structured observations, the categories could be very broad, or very detailed, depending on the type of data needing to be collected. To define the categories, the researcher may need to perform a pilot study using free observation. Then, the researcher can use the results of the pilot study to define categories for the actual studies. Structured observations make comparisons between studies easier in multiple study research (Rauterberg, 2010).

It is useful for the observer to write down the time, the type of activity, and where it took place. Errors and misunderstandings in using certain products can also be practical (Rauterberg, 2010). According to Drury (1995), five types of information could be recognized in observations: (a) Sequence on Activities, which is a set of certain activities follow others; (b) Duration of Activities, which is the period of time that a particular activity usually takes; (c) Frequency of Activities, how often activities or events occur; (d) Fraction of Time Spent in State, or the time taken in one state or activity; and (e) Spatial Movement, or the place that the observed people move to or from during a specific event or activity.

In this research, four types of information were recorded. Firstly, the activities that involve classroom settings were noted. This type includes detailed descriptions for the activities in addition to their sequence. Secondly, the time of the activity and how long it took to completion is recorded. Thirdly, the settings used during a certain activity and how they were being used are noted. This explains the movement of participants for a certain activity. The fourth type of information is the number of participants in a certain activity, and sketches that show the location of each activity inside the classroom. See Appendix C for the observation sheet.

6.5.3 PHYSICAL ARTEFACTS.

Another source of information the researcher used in studying cases is physical artefacts (Yin, 1994), such as physical evidence formed by the measurements and photos taken from the site. Tools, such as a camera and measurement tape**s**, were used to collect the physical evidence, in addition to the personal assessment. Physical artefact source provides the project with information about the classroom dimensions, finishing materials, and furniture layout, in addition to the existing design quality, including lighting, acoustics, and ventilation system. These

pieces of information outline the base of each case study, as they provide the floor plans, sketches, and elevations for each classroom. See Appendix C for classroom measurements and sketches form.

6.6 CRITERIA FOR INTERPRETING THE FINDINGS

The information gathered in the data collection stage needs to be analysed in a certain way (Yin, 1994). In addition to statistical analysis, there are two general strategies for analysing case study evidence. The first is relying on theoretical propositions. This strategy depends on setting objectives and designing the case study according to the study proposition. The other strategy is developing a case description through designing a framework to organize the case study. This strategy is usually used to identify the type of certain events and the overall pattern of the case (Yin, 1994). In this research, the analysis of case studies is based on the first strategy. As mentioned in Section 1.3, the researcher suggests a group setting for the MI theory in primary classrooms. Based on this proposition, the data from the case study is being analysed.

Specific techniques could be used within any general strategy for analysing case studies:

- Pattern Matching: this technique compares empirically based patterns with one or more predicted ones. It focuses on patterns from case studies that match with patterns from the predicted case.
- Time-Series Analysis: it discusses the multiple changes in a single variable over time.
- Program Logic Models: this strategy is a result of combining the Pattern Matching and Time-Series Analysis techniques (Yin, 1994).
- Explanation-Building: is the technique used in this research. The aim of this technique is analyzing the case study data by constructing an explanation about the case. Building an explanation depends on

98

creating a presumed set of links about it. In this technique, the case study data reflects theoretically significant propositions. The analysis could be a result of a series of iterations. It starts with creating initial theoretical statements or propositions. Secondly, comes comparing the data from each case study with such statements or propositions. Thirdly, comes revising the initial statements or proposition. Fourthly, is comparing other details in the case study with the revisions. Finally the process is repeated as many times as is needed (Yin, 2009).

The explanation-building technique is used in this research to support the main strategy of relying on theoretical propositions. In Chapter 8, the four case studies are analysed, based on the proposition in Section 1.3 in this chapter. The researcher discusses these classrooms in terms of the extent to which they support the MI theory.

Each intelligence is examined in these learning environments. This includes investigating the existing settings that may meet the MI criteria. The researcher also discusses the possibility of using existing or adding other settings in the same classrooms studied in the previous chapters.

In addition to the major techniques, other techniques can be used, usually in conjunction with one of the previous major techniques:

- Analysing Embedded Units: this technique is used when the case-study design includes a fixed unit. For example, the unit could be a set of responses to a survey or interviews.
- Making Repeated Observations: this type of analysis is used when observations are made over time. It could be across different classrooms, schools, students, or other units of analysis. This technique is used in this research by observing the classroom routine for one day in each of the four classrooms.
- Doing a Case-Survey: it is a second analysis across cases. It is usually used in numerous case studies (Yin, 1994).

In general, when using any of the above techniques and strategies, there are four rules that must be followed to achieve high quality analysis. The analysis should incorporate as much evidence collected from the case study as possible. Secondly, it should include all rival explanations. Thirdly, the analysis should show the major finding of the case study. Finally, it should reflect the investigator's knowledge (Yin, 1994).

Summary

Case study methodology has been chosen for conducting this research, and is completed in five stages. Each stage provides groups of techniques and principles for the case studies. The first stage is identifying the study question, which aims to achieve the main target of the study. Second, is refining the study proposition, which in this case is to discuss the MI theory as related to designing classroom settings. Thirdly, is setting the units of analysis, which are (giving the time limitation for a master's thesis) four classrooms, four teachers, and twenty students from four different, state primary schools in Wellington City. Fourthly, the researcher will collect data via three methods: interviews, direct observation, and physical artefacts. Finally, is using principles for interpreting data into case study reports. The actual reports are provided in Chapter 8 after introductions and basic information about each case study are given in Chapter 7.

CHAPTER 7: WELLINGTON'S PRIMARY SCHOOLS – FOUR CASE STUDIES

Introduction

The previous chapter presented the case study design. The outcomes of the methodology described in the last chapter are a number of interview forms and information sheets. After finishing the fieldwork, this chapter presents basic information on the case study classrooms. The aim of this chapter is to introduce the four classrooms in order to aid the understanding of the analysis presented in the following chapter. This chapter only represents facts about the classrooms. The information was extracted from each classroom's measurements and observation sheets.

This chapter is divided into four sections. Each section represents one of the four case study classrooms and contains two sub sections. The first one gives general information about the school, brief history, and simple description, and the second subsection gives information about the specific classroom studied using plans and photographs. In addition, there is a description of the classroom setting and its interior design. See Appendix D for more detailed information about furniture, materials, and colours for the four classrooms.

7.1 CASE STUDY ONE: CLYDE QUAY SCHOOL

7.1.1 BACKGROUND TO THE SCHOOL.

In 1889, the full primary school Clyde Quay was established. The school is situated on Elizabeth Street in Mount Victoria in Wellington City. It serves around 240 children. The decile 8 school has families from different socio-economic groups and different ethnicities (Clyde Quay School Website, 2010). A group of small buildings placed around the central playing field (Figure 7-1) forms the school campus. Most of the school rooms and classrooms open to this playing field. The studied classroom is located on

one of the campus corners. The classroom is surrounded by other rooms on north and east. The west side faces a neighbour's house, while the south windowless wall faces the street.

FIGURE 7-1. CLYDE QUAY SCHOOL'S SITE PLAN SOURCE: GOOGLE MAPS, 2011.

7.1.2 CLASSROOM DESCRIPTION.

The classroom (Figure 7-2) is a 64.75 m^2 rectangular open space. It serves 30 students, aged 9–11 years old, and one teacher, thus providing 2.2 m^2 of classroom area per student (2.0 m^2 /student without the art area).[10]The main and only entrance is the classroom door, which opens to a veranda that leads to the playground and other classrooms. This arcade is like an outdoor corridor that links most of the schoolrooms. Doors linking the classroom with the neighbouring classroom are not used. They are treated as a part of the wall. The classroom depends on two settings, tables and chairs, and a large free space known as the 'mat.' Tables are placed in groups of two or three, positioned around the mat area.

---

10 Art area is omitted in Clyde Quay, Thorndon, and Roseneath Classrooms as the art area in Northland school is not inside the classroom studied.
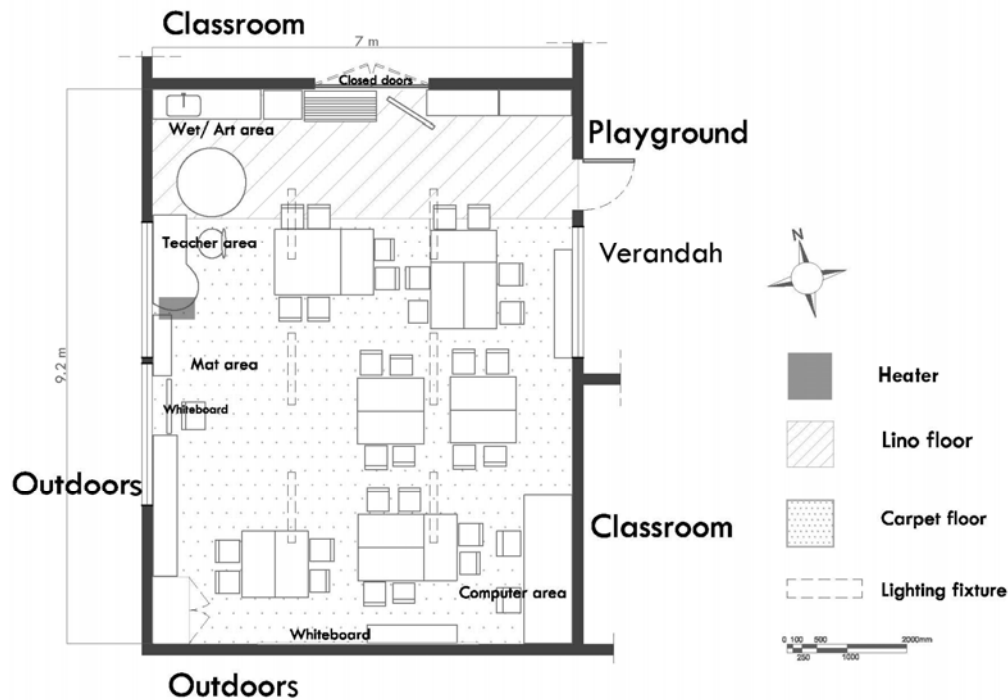
FIGURE 7-2. CLYDE QUAY CLASSROOM'S FLOOR PLAN.

The classroom has three different sizes of student's chairs varying in seat height and seat area. The mat area is located near one whiteboard and the main windows. There is a chair for the teacher on the mat, as well as in the teacher's area. The teacher's area is located next to the mat and consists of a desk, some shelves, and a round table. In the corner, next to the teacher's area, is the wet area comprised of a sink bench and lino flooring. The computer area is located in another corner and consists of one large table, two computers, and one ink-jet printer. The classroom has a range of storage units, such as cabinet, bookshelves, and students' boxes lined against the walls. The large whiteboard is placed on one of the walls and is not used for daily teaching. Instead, it is used for hanging posters and writing schedules. Student's bag hooks are placed outside the classroom within the veranda.

The majority of classroom furniture is made of plastic, metal, and medium-density fibreboard (MDF). The dominant furniture colours are blue, dark bluish gray, light brown, and white. The classroom finishes are carpet and lino on the floor, aluminium windows and doors, painted ceiling trusses, and fabric on the walls. The colours of finishes are mainly blue, beige, light brown, and yellow. The classroom lighting depends on six fluorescent lighting fixtures. The classroom does get some natural light, but in only small amounts. One of the windows faces a shaded veranda that admits no direct sunlight. The other window faces a neighbouring house located about two metres away, which restricts any winter direct sunlight. All the windows and the door open to allow natural ventilation. The classroom in heated by a single small electric heater located near the teacher's area and the mat. Drapes, carpet, and some upholstered furniture provide some acoustic absorption (Figure 7-3).

Students spend most of the class time between tables and the mat. Students are not allowed inside the classroom during the morning tea and at lunchtime.

FIGURE 7-3. CLYDE QUAY CLASSROOM, INTERIOR VIEW LOOKING AT SOUTH-WEST.

7.2 CASE STUDY TWO: THORNDON SCHOOL

7.2.1 BACKGROUND TO THE SCHOOL.

Thorndon Primary School was established in 1852. In the first part of the last century, Thorndon School was the largest school in the city. In 1990, the number of students enrolled decreased to fewer than 100. During the last 10–12 years, the school has grown, thus requiring additional classroom extensions. Now, Thorndon School is a small sized school consisting of four buildings. Thorndon School has 10 classrooms, a library, hall, art room, music room, technology room, small grassed playing field, and a sealed netball/basket ball court (Thorndon School website, 2010) (Figure 7-4). The school has a decile 10 rating. The studied classroom in this school is located in the middle of one of the school buildings. It opens to the playground to the west and to the classroom garden from the east. The north and south sides are next to other rooms (Figure 7-5).

FIGURE 7-4. THORNDON SCHOOL SITE PLAN. SOURCE: GOOGLE MAPS, 2011.

7.2.2 CLASSROOM DESCRIPTION.

The classroom is a rectangular space with an addition on one side and an omitted corner. The classroom is divided visually into two zones by a small partition wall. The 82.03 m^2 classroom serves 29 students, aged 9–11 years old, and one teacher. The space to student ratio is 2.8 m^2 per student (2.5 m^2 /student without the art area). The main entrance is the classroom door, which opens to a small veranda and leads to the playground and other rooms (Figure 7-5). A second door opens out to the classroom's garden. This door is also used as an emergency exit. The classroom's garden has a sandpit, planting boxes, and some vegetation. The planting boxes are used by the classroom gardening club to grow and take care of flowers and vegetables. This garden is next to another classroom's garden. Inside the classroom, students' work is divided between tables and chairs and the mat area. Students sit in groups of 4–8. Tables are in two different sizes and of changeable height. Four of the tables are placed straight and

only one table is placed diagonally. Chairs are of two types with different sizes and heights. All the chairs except three are placed to face the whiteboard. The mat area is located near the whiteboard and consists of a chair for the teacher, some tables, and some shelves. Next to the mat, there is a library corner. It consists of bookshelves and some soft cushions. The small partition wall gives the library corner some privacy and helps in making it appear quieter than the rest of the classroom. Next to the partition wall, there is a computer area. It consists of four different tables and four computers.

The teacher's area is located near the storage room and next to one of the classroom windows. The area consists of two large desks, some shelves, and a lockable station. Only the teacher uses the storage room; students are not allowed to enter. It is used for storing large items and materials. The art area is located on the lino area. It consists of one large art table in addition to a sink bench. On the lino area, there are bag hooks for the classroom students. The classroom has a range of storage units, such as cabinet and shelves (Figure 7-6).
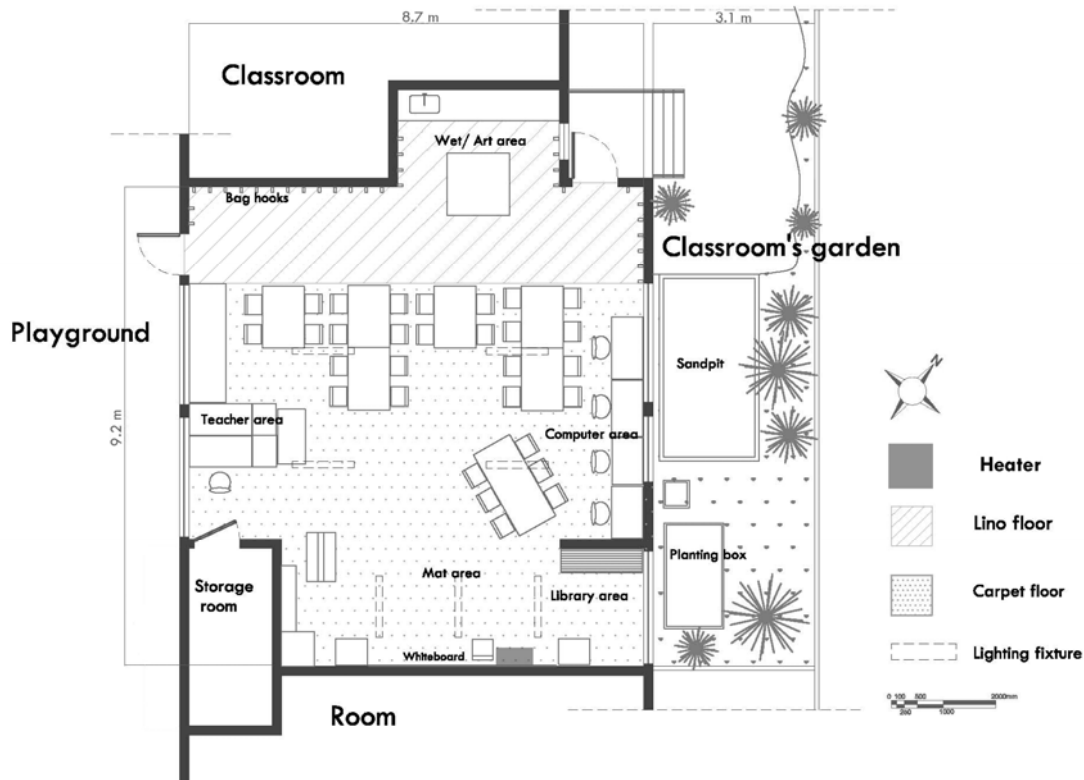
FIGURE 7-5. THORNDON CLASSROOM'S FLOOR PLAN.

The classroom furniture is mainly made of plastic, metal, and Medium-density fibreboard (MDF). The furniture colours are mainly beige, red, blue, and white. On the other hand, the classroom finish materials are carpet, pin board, lino, and fabric on walls and floor, and ceiling tiles for the ceiling. The dominant colours are dark green, light green, beige, and white. The classroom lighting depends on eight fluorescent lighting fixtures in addition to the natural light. The natural light is provided through two large windows, and one glass door opening to the playground. In addition, there are three large windows, and another glass door towards the classroom garden on the other side. The classroom depends on natural ventilation through windows and doors and has one small electric heating unit located on the whiteboard wall near the mat. The acoustics treatments in the classroom depend on the floor and wall carpet, window blinds, some fabric cushions, and some upholstered furniture.

FIGURE 7.6. THORNDON CLASSROOM, INTERIOR VIEW LOOKING AT SOUTH-EAST.

7.3 CASE STUDY THREE: NORTHLAND SCHOOL

7.3.1 BACKGROUND TO THE SCHOOL.

Northland School is a full primary school established in 1906. It is located in the middle of the Wellington suburb of Northland (Northland School Website, 2010). Northland School has a decile 10 rating. The school campus consists of two separate buildings, playground, and playing field. The studied classroom in this school is located on one corner of one of the two buildings. It opens to the playground and playing field to the west (Figure 7-7).

FIGURE 7-7. NORTHLAND SCHOOL SITE PLAN. SOURCE: GOOGLE MAPS, 2011.

7.3.2 CLASSROOM DESCRIPTION.

The classroom is a rectangular open space, 55.38 m^2 in floor area. It serves 28 students, aged 9–11 years old, and one teacher, with a ratio of 1.98 m^2 per student. The main entrance, which is the classroom door, opens to an indoor corridor that leads to other classrooms, the art area, and bag hooks for the classroom students. As shown in Figure 7-8, there are two sliding walls – one opens to the other classroom and the other to the indoor corridor. In addition, a sliding glass door leads to the outdoor playground and the playing field. As with many other primary classrooms, this classroom consists mainly of students' working settings, which are desks and chairs, and a large free space called the mat area. Desks and chairs are arranged in groups of six or four desks per group. Chairs, all of the same size, are placed to face the whiteboard on one of the classroom walls. The mat area is located near the whiteboard, with the teacher area to the side. The teacher area contains a desk, some shelves, and a lockable station. The classroom also contains a range of storage units and computer area with two desktop computers. This classroom does not have its own art/wet area.

Instead, the art area that the class can access is outside the classroom and shared with two other classrooms (Figure 7-8).
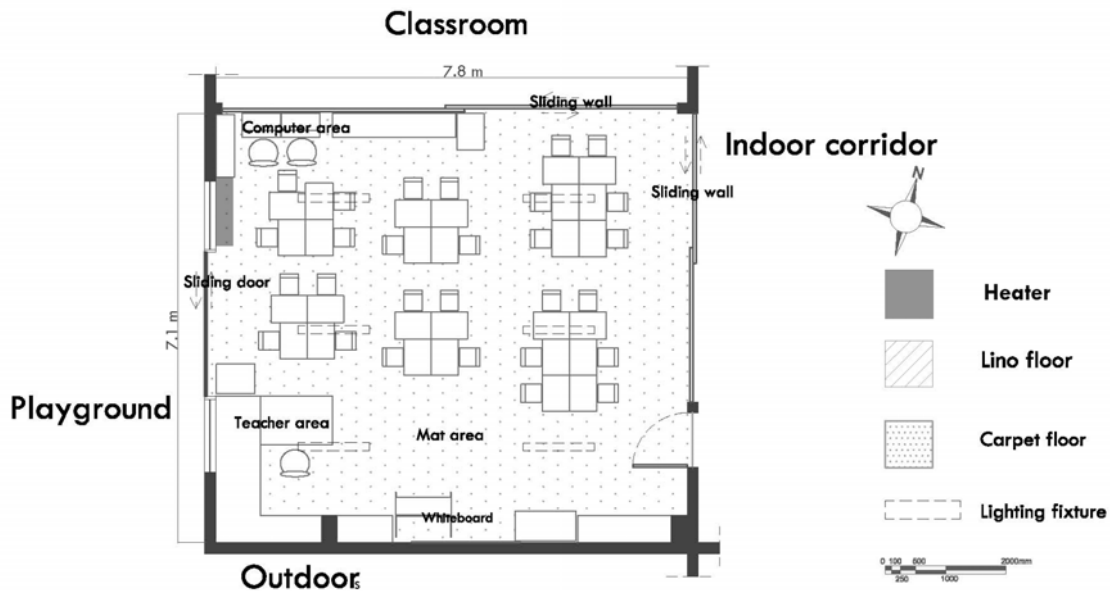

FIGURE 7-8. NORTHLAND CLASSROOM'S FLOOR PLAN.

The majority of this classroom's furniture is made of plastic, MDF, or wood. The dominant colours are blue, light brown, gray, red, and pink. The finishing materials are carpet, wood, fabric, aluminium, and glass, ranging in colour from white, bluish gray, to light blue. The classroom's lighting depends on six fluorescent lighting fixtures, in addition to the natural light. The natural light is provided through the sliding glass door and two small windows on one of the classroom walls (Figure 7-8). These two windows and the sliding door, in addition to the main door and the sliding walls, help in getting the classroom naturally ventilated. The classroom has one gas-heating unit located near the computer area. Materials, such as carpet and upholstery, help in improving the classroom acoustics (Figure 7-9).

Students spend their time in the classroom between mat area and their desks. They spend part of the morning tea and lunch break time inside the classroom.

FIGURE 7-9. NORTHLAND CLASSROOM, INTERIOR VIEW LOOKING AT NORTH- WEST.

7.4 CASE STUDY FOUR: ROSENEATH SCHOOL

7.4.1 BACKGROUND TO THE SCHOOL.

Roseneath School is a small primary school located at the top of Maida Vale Road in Roseneath, above Oriental Parade. The school has magnificent views of Wellington Harbour. The school was established in 1898. It was remodelled in 1978 and again in 1999 to accommodate more students (Roseneath School Website, 2010). Roseneath School is a decile 10 rating school. Its campus consists of one building and two playing fields. Most of the classrooms are accessed from a long indoor corridor. The studied classroom is located in the middle of the corridor, and is thus surrounded by classrooms from the west and east and the corridor on south. The north side faces outdoors (Figure 7-10).

FIGURE 7-10. ROSENEATH SCHOOL SITE PLAN (SOURCE: GOOGLE MAPS, 2011).

7.4.2 CLASSROOM DESCRIPTION.

The classroom is a rectangular space with a little addition on one side. The 62.14 m^2 classroom serves 28 students, aged 9–11 years old, and one teacher, with a ratio of 2.2 m^2 per student (2.1 m^2/ student without the art area). The classroom is divided visually into two zones by two steel columns. The main and only entrance to the classroom is a door that opens to an indoor corridor that connects all the school's rooms with each other. In this indoor corridor, students' bag hooks are located in front of each classroom. In the studied classroom, a sliding door opens to another classroom. However, the door is not used to connect the two classrooms; instead it is treated as a part of the wall. On the north side, a glass wall overlooks the outside of the school, but does not have a door (Figure 7-11).
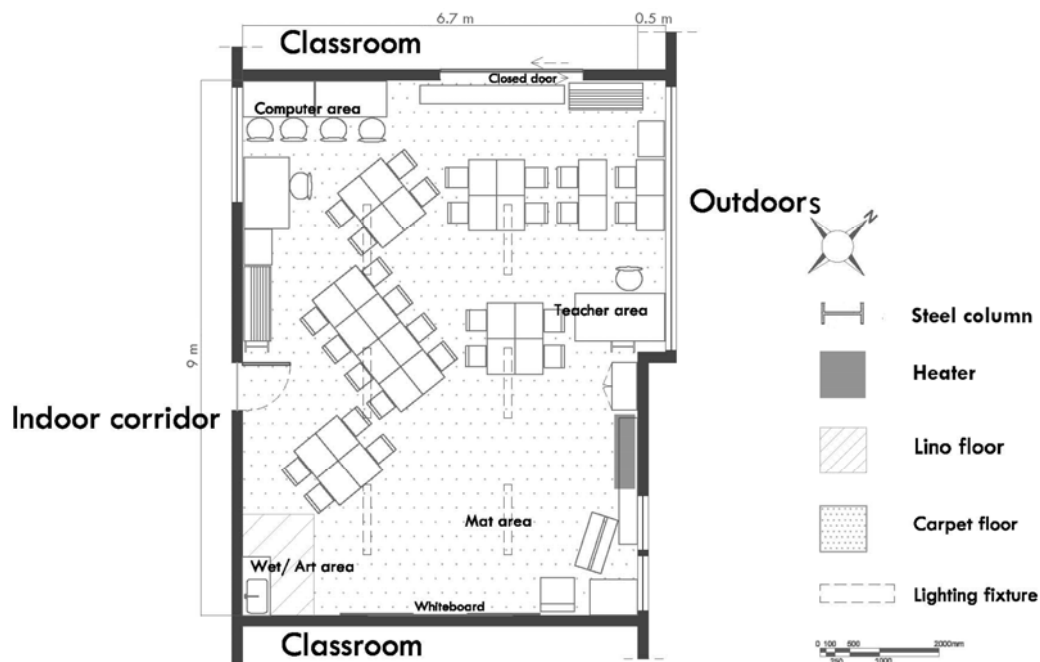
113

FIGURE 7-11. ROSENEATH CLASSROOM'S FLOOR PLAN.

In terms of classroom settings, the majority of the classroom teaching and learning is completed on either the mat area or at the students' desks and chairs. Desks are in only one size, and they are gathered in groups of 2–8 desks per group. Three groups of desks are placed diagonally, whilst others are straight. Chairs are of three different types and sizes. Some of the chairs are new and others are very old. Most of the chairs are placed to face the main whiteboard in the class. The mat is located near the whiteboard. The mat area contains a chair for the teacher, a drawing/whiteboard stand, and some shelves. Next to the mat, there is a small wet area with a small sink bench. The teacher's area is located behind one of the steel columns. It consists of only one large table with a chair. The computer area is in a corner far away from mat area. There are three large tables with five computers. The classroom contains a range of storage units, such as shelves, cabinet, and bookshelves (Figure 7-11).

A range of materials is used in furniture, such as plastic, MDF, metal, and wood. The furniture's colours are mainly light brown, blue, and white. The

114

finish materials are fabric on walls and floor, wood panels, pin board, and paint on walls. The dominant colours on finishes are bluish green, dark green, red, and light brown. For lighting, the classroom depends on six fluorescent lighting fixtures in addition to the natural light coming through the windows. The classroom has four small windows and the glass wall on the side facing the outdoor area. Another large window overlooks the indoor corridor. The outside views include the beautiful landscape of Wellington Harbour. The ventilation is natural, through the door and windows, aided by two ceiling fans. The classroom has a heat pump on one of the walls, near the mat. Some treatments, such as fabric on the floor and walls, window blinds, and some upholstered furniture (Figure 7-12) improve the acoustics in this classroom.

Students spend almost the entire school day inside the classroom. They eat and work at their desks or on the mat. Students from other classrooms join in to use computers or to have lunch.

FIGURE 7-12. ROSENEATH CLASSROOM, INTERIOR VIEW LOOKING AT THE NORTH.

Discussion

From the basic description of the four classrooms in this chapter, some shared classroom characteristics are revealed. Classroom layouts consist mainly of a mat area and students' desks, in addition to some secondary settings, such as computer and art areas, located in the classroom corners. Another shared feature is the location of the mat area in the southeast side of the classrooms, except in Clyde Quay Classroom, where the mat is on the northwest side. The teacher's area is located near a window in all classrooms. The classroom materials are almost the same in the four studied classrooms. Two of the classrooms are connected to other classrooms, but the connection is not used at all. This highlights the fact that students do not have the potential benefit from open and shared spaces in learning environments. These shared features could define some typical characteristics of New Zealand primary school classrooms. However, because this is a case study research, the four classrooms cannot represent a sample of New Zealand schools and it is difficult to generalize the findings to other schools. The shared settings and features simplify the analysis process, as similar settings can be easily compared. The next chapter analyses each of these settings in detail. It also proposes some beneficial changes for settings in single classrooms.

CHAPTER 8: CASE-STUDIES ANALYSIS

Introduction

The previous chapter presented facts about the four classrooms studied in this research. The classrooms consisted of almost identical groups of settings. As the aim of this research is to study typical high decile rating New Zealand primary school classroom settings, this chapter studies and analyses each setting depending on the user's opinions and the researcher's findings. This chapter's aim is to understand the function of classroom settings and to find which settings support the MI theory. In this chapter, the information about the four classrooms is derived from student interviews, a teacher questionnaire, student drawings, and researcher observation.

This chapter is divided into six sections. The first five sections are the existing patterns of use, which include settings, such as reading and computer settings; working situations; aesthetics; overall assessment; alignment with the MI theory; and the teachers. These sections analyse each classroom's settings in terms of findings from the user's survey or researcher observations, the relation between these settings and MI theory, and recommendations and discussion about existing issues stemming from the settings. The findings provide the opinion of five students and the classroom teacher in addition to the researcher's one-day observations.

The recommendations are confined to general ideas and suggestions, rather than practical solutions, as they cannot be readily applied in these schools. These recommendations are presented to give the reader an idea about what can be created to improve classrooms settings. Recommended books by the Ministry of Education give some of the information in the discussions about settings. The sixth section uses these analyses to review the propositions of the study, as well as providing a list of settings suggested by the users that support the MI theory.

117

8.1 EXISTING PATTERNS OF USE

8.1.1 READING AND WRITING SETTINGS

For investigating reading and writing settings, students' interviews and the teacher's questionnaire questioned where students usually read and write, whether these settings are good for such activities, and where in the classroom students usually work the most.

In the four classrooms, there were tables and a mat area, whereby the tables were mostly used for working and learning, whilst the mat was where instructions and teaching took place. Teachers and students of all classrooms stated that most reading and writing activities were completed on student's tables and desks. Roseneath and Northland classroom teachers declared that reading and writing were also completed on the mat area. The Clyde Quay teacher and Northland, Thorndon, and Roseneath students confirmed that most of the work was completed on tables, whilst the rest of the participants stated that most of their work was completed either on students' tables or on the mat.

In the Clyde Quay classroom, students were positive about reading and writing settings, although some students complained that they needed a quieter and more comfortable area with larger tables. In contrast, the teacher felt that the tables were unsuitable for writing activities. He stated that chairs were at different heights, thus they did not always suit the children's heights. In addition, the chairs were deemed uncomfortable if used for long time. On the observation day, the researcher saw that students spent about 45% of class time using their tables. The mat came in the second place, accounting for 22% of the class time (Figure 8-1).

In the Thorndon classroom, both the students and the teacher were positive about their existing reading and writing settings, and they confirmed that these settings were quite comfortable. One student complained that the chair sizes did not suit her size: "they are not high enough and not deep

enough." Students found it easier to do writing at their desks, as the mat was perceived as too bumpy. The teacher declared that some reading activities were completed in the library area, where she had made some soft cushions (Figure 8-2). According to the researcher observation, students spent about 39% of the class time using tables and 26% on the mat (Figure 8-3).

In the Northland classroom, both the teacher and students were positive about their reading and writing activities. Students found that the individual desks gave them privacy, in addition to that, the chairs were comfortable and their sizes were deemed just right. However, students reported that they needed bigger desks (Figure 8-4). One student claimed that it was sometimes hard to read or write because of "too much sunlight." One student declared that most of the students' items were in the desk trays, so it would be difficult for students to bring the trays with them every time they worked on the mat. According to the researcher observation, the time spent working on tables accounted for 48% of the class time, whilst just 21% was spent on the mat (Figure 8-5).

In the Roseneath classroom, students were neutral about reading and writing settings, but they found them comfortable. Some students complained that the classroom had new chairs for some students, whereas others still had to use old chairs. Other students complained about the sun glare and noise inside the classroom. In terms of writing on the mat, one student claimed that it was hard to write on the bumpy carpet. The teacher considered the desks inappropriate because they were not comfortable or relaxing for independent learning, whilst they were good for instructional reading or teacher guiding. According to the researcher observation, 43% of the class time was spent on the mat, with 31% spent at desks (Figure 8-6). However, the teacher declared on the observation day that this was exceptional and that students usually did not spend that much time working on the mat.

THE SETTINGS IN RELATION TO MI THEORY.

The intelligences involved in the reading and writing settings in these four classrooms were linguistic intelligence, logical-mathematical intelligence, interpersonal intelligence, and intrapersonal intelligence. For linguistic intelligence (Table 8-1), all four classrooms had tables and chairs settings. Only the Thorndon classroom had special soft seating space for reading − the library corner. All four classrooms had bookshelves. However, the books were not sorted in any specific order, such as alphabetically or by subjects. No classroom had a specific space for telling stories and giving speeches, such as a mini stage or a corner. The classrooms used the mat for these activities.
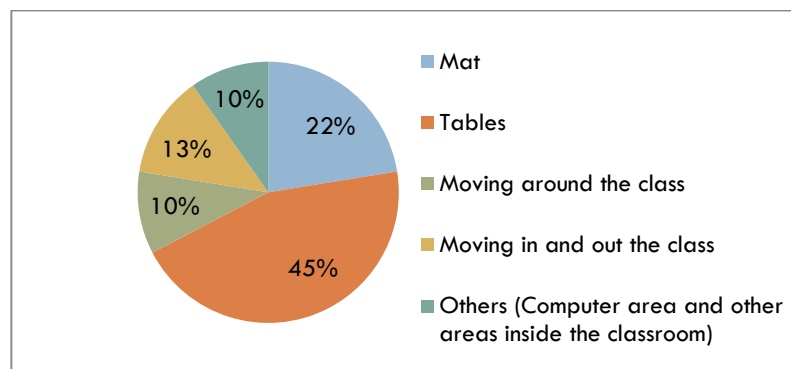
FIGURE 8-1. THE TIME SPENT ON DIFFERENT SETTINGS IN THE CLYDE QUAY CLASSROOM.
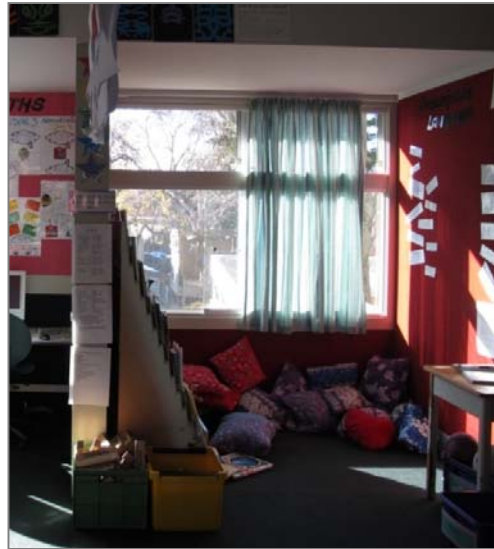
FIGURE 8-2. THE LIBRARY CORNER IN THE THORNDON CLASSROOM.
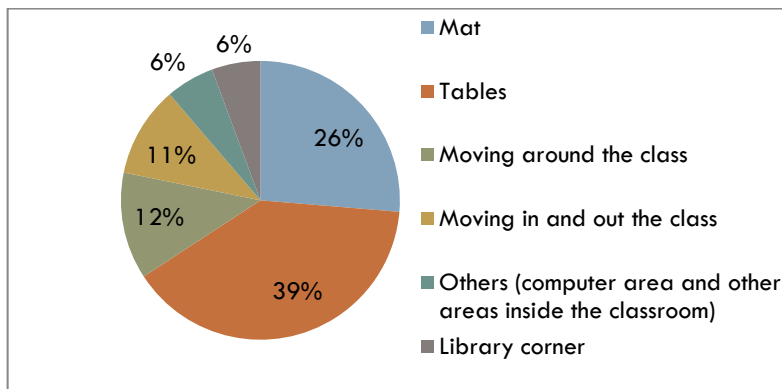
FIGURE 8-3. THE TIME SPENT ON DIFFERENT SETTINGS IN THE THORNDON CLASSROOM.

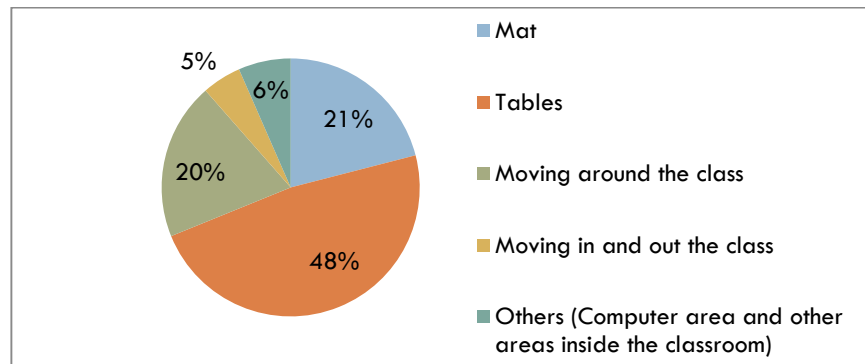*FIGURE 8-4.* THE SMALL DESKS IN THE NORTHLAND CLASSROOM.

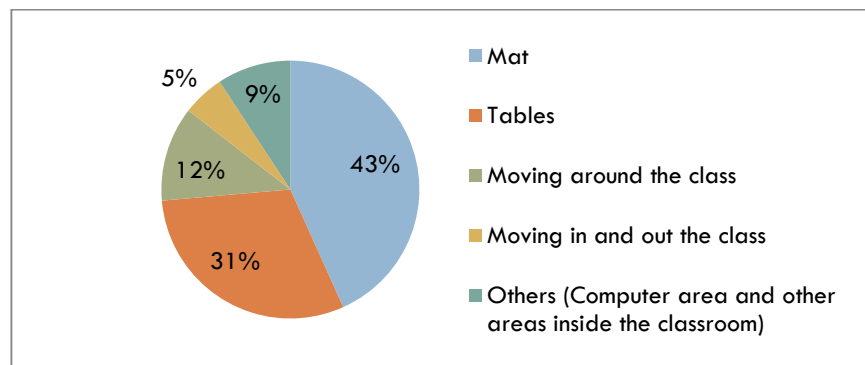*FIGURE 8-5.* THE TIME SPENT ON DIFFERENT SETTINGS IN THE NORTHLAND CLASSROOM.

FIGURE 8-6. THE TIME SPENT ON DIFFERENT SETTINGS IN THE ROSENEATH CLASSROOM.

For logical-mathematical intelligence (Table 8-2), all four classrooms depended on the chairs and tables, in addition to the mat area. These

settings worked well as a discussion table. There were no nooks or private spaces for thinking, except for the library corner in the Thorndon classroom.

For interpersonal intelligence, the researcher suggested the proposition that such intelligence could be supported with any settings that involved more than one user. Two of the classrooms, Clyde Quay and Thorndon, had group tables, which could accommodate a group of students together. In the Northland and Roseneath classrooms, although they had individual desks, these desks were placed in groups, allowing students to sit together. The mat is another setting that may support such intelligence. All four classrooms had a mat area for whole class teaching and instructions.

For intrapersonal intelligence (Table 8-3), three classrooms – Clyde Quay, Northland, and Roseneath – had one individual desk and chairs placed away from other tables and chairs. This desk was the only setting in these classrooms that could support such intelligence. There were no study carrels or lofts with nooks, which could provide some privacy. The Thorndon classroom had the library corner, which might give some privacy to students.

TABLE 8-1: POSSIBLE DESIGN SETTINGS FOR LINGUISTIC INTELLIGENCE.

DESIGN SETTINGS:
SOFT FLOOR SEATING OR COUCHES WITH SOME CUSHIONS
SOME TABLES AND CHAIRS FOR SEATING (IT COULD BE ONE LARGE TABLE WITH SOME CHAIRS)
COMPUTER TABLES SUPPORTED BY PRINTERS AND WRITING SOFTWARE
MINI STAGE OR SPECIAL CORNER FOR TELLING STORIES AND GIVING SPEECHES
BOOK SHELVES AND TOOL CABINETS (CONTENTS COULD BE SORTED IN ALPHABETICAL ORDER)
VIDEO AUDIO SYSTEM

TABLE 8-2: POSSIBLE DESIGN SETTINGS FOR LOGICAL-MATHEMATICAL.

DESIGN SETTINGS:
NOOKS, WALL NICHES OR WINDOW BENCHES FOR PRIVATE THINKING
A ROUND TABLE FOR GROUP DISCUSSION AND WRITTEN WORK
COMPUTER CENTRE SUPPORTED BY SPACE FOR ANALYSING AND DISCOVERING TECHNOLOGY (A COUNTER FOR DISCOVERING HOW MACHINES WORK – A RADIO OR A MOBILE PHONE, FOR EXAMPLE)
A COUNTER AND SOME HIGH CHAIRS FOR SCIENCE EXPERIMENTS SUPPORTED BY WATER TAP AND CABINETS FOR STORING EXPERIMENTAL EQUIPMENT
A PLACE TO DISPLAY STUDENTS' WORK AND ACHIEVEMENTS

TABLE 8-3: POSSIBLE DESIGN SETTINGS FOR INTRAPERSONAL INTELLIGENCE.

DESIGN SETTINGS:
STUDY CARREL
LOFT WITH NOOKS FOR MORE PRIVACY
COMPUTER CORNER
IT COULD ALSO BE ACHIEVED BY WORKING WITH OTHER PEOPLE

DISCUSSION AND RECOMMENDATIONS.

According to the findings from the four classrooms' writing and reading settings, all four mainly depended on tables and chairs, with some time spent on the mat. Students spent most of the time between their tables and the mat, possibly because the classrooms did not contain other settings suitable for these activities. Classrooms may need more variety in reading and writing settings.

In the Thorndon classroom, because of the library corner, students had flexibility in their working spaces more than in the other classrooms. In the next sections, Thorndon students confirm that the library corner is used for many learning activities. The missing MI settings in these classrooms could be replaced with existing settings. For example, if no space gives privacy for individual students, some of the classroom furniture, such as the bookshelves, could create a space (Figure 8-7). In this example, the private space could be multipurpose. It could be a reading corner with some cushions, or a private thinking space with some math aids and tools.

Another issue in writing and reading settings was the plan and the size of tables and chairs. All classrooms had different sizes of chairs, except for Northland. Although there is a study on chairs and desks to match students needs (Kane et al., 2006), in all classrooms the participants claimed that the different sizes of chairs were not necessarily the right sizes for the children. The outcome of the furniture development study was a group of dynamic chairs desks and storage units for different sizes of students aged 5-17. This furniture has been in use in New Zealand schools since February 2005. However, the case study schools still use old chair styles except in Roseneath, where some students have the new chairs. In terms of tables, the desks and tables were functionally the same. There was no difference in the efficiency and frequency of their use, as desks could be gathered to form a group table.[11] However, most students complained about the need for soft settings inside the classroom. During the drawing exercises, many students drew couches, cushions, and other soft settings (Figure 8-8). Some classrooms also had issues with noise and lighting inside the classroom during reading and writing activities. This is discussed in the sections on acoustics and lighting.

---

[11] More discussion about single decks and group tables is provided in the second section of this chapter.
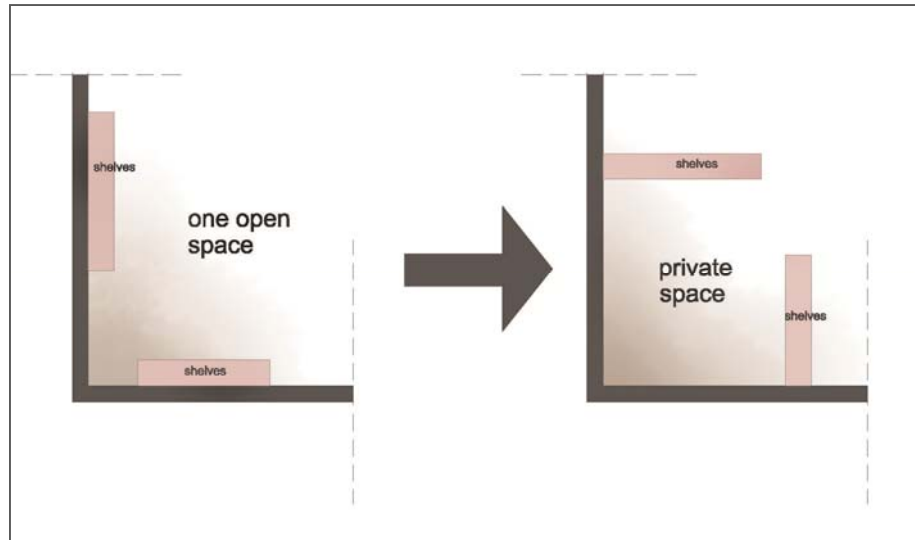
FIGURE 8-7. CONVERTING OPEN SPACES TO SEMI PRIVATE SPACE BY CHANGING THE FURNITURE ARRANGEMENT.
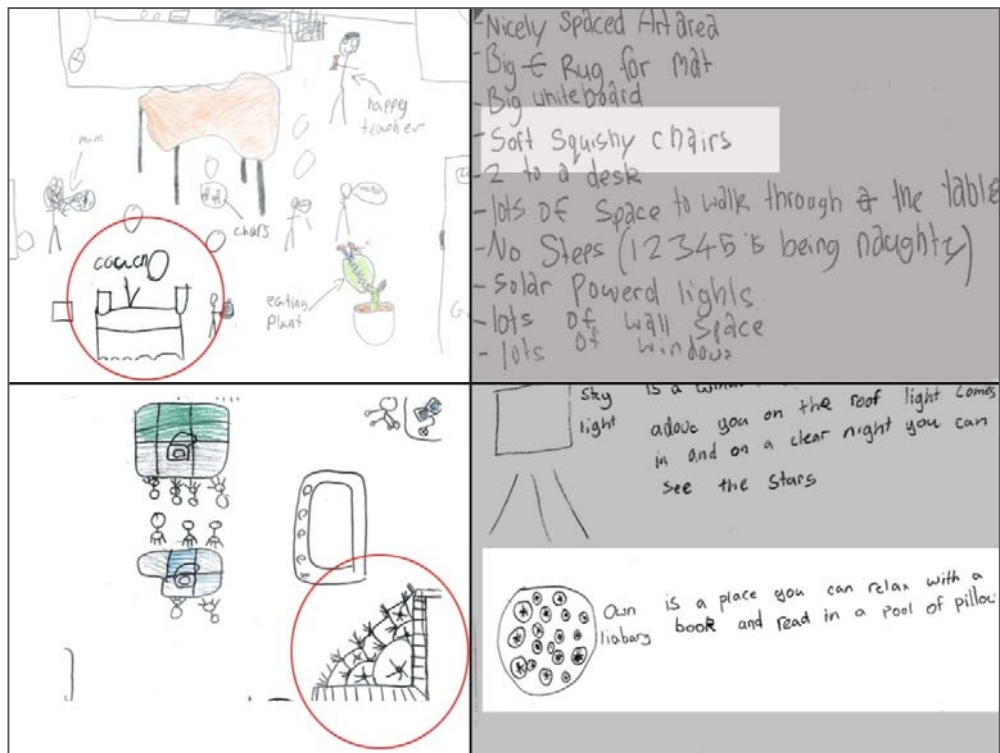

FIGURE 8-8. SOME OF CLYDE QUAY AND NORTHLAND STUDENTS' DRAWINGS THAT SHOW THEIR NEED FOR SOFT SETTINGS.

8.1.2 COMPUTER SETTINGS

In terms of computer settings, the interview and questionnaire had questions, such as "Are there enough computers in the classroom?" and "Is the computer area good and comfortable?" The Clyde Quay and Northland classrooms contained two computers each, while the Thorndon classroom had four and Roseneath, five. Students and teachers of the Clyde Quay and Northland classrooms, in addition to the students of the Roseneath classroom stated that there were not enough computers in their classrooms, whilst the rest of teachers and students found the existing number sufficient.

In the Clyde Quay classroom, most of the students were negative about the computer settings. Students complained that sometimes they needed to go to the computer laboratory to work on computers, as there was only one working computer, and they suggested that three computers in the classroom would be much better. Students were concerned about the very narrow space between the computer area and other settings, in addition to the small size of the computer table, where students could not put other items, such as a book, while working on the computer.

The teacher considered the computer settings as "okay," although he claimed that they were "squashed" in the corner and that the computer pod could not hold all students at the same time (Figure 8-9). He also confirmed that the class needed to use computers in other classrooms. According to the researcher observation, the computer settings were compressed into one corner and there was hardly any space between these settings and others. However, the computers were rarely used on the observation day. Only three students used the computers, but not at the same time.

In the Thorndon classroom, students and the teacher were positive about the computer area. However, students complained that there was not enough space for computer settings and that the computer tables were not steady

(Figure 8-10). The teacher declared that there was a pod of netbooks that she could book for the whole class when needed. According to the researcher observation, the computers were not used on the day of observation.

In the Northland classroom, students were positive about the computer area. However, one student complained that computer chairs were too hard. The teacher was neutral about the computer settings and confirmed that there were only two computers for 27 children. There were six laptops for a group of three classrooms. For these reasons, the teacher could only use the computers as a part of group activities. According to researcher observation, there was not enough space between computer settings and other settings (Figure 8-11). On the observation day, the use of the computers during the classes was hardly noticed. However, during the morning break, two students used the two computers while a group of students gathered to watch and comment.

In the Roseneath classroom, students and the teacher were positive about the computer area. The teacher confirmed that she would not want more computers because of the space they would take. She claimed that there was no alternative location for the computer area: *"They are where they plugged them in."* She also considered it good, as the computers were out of the direct sunlight, and she assumed that *"rolly chairs"* (chairs that have wheels) could be a nuisance. She stated that there were five laptops and a data projector in the school that she could bring in any time they needed them.

According to the researcher observation, the space for the computers was quite small. One of the computer tables was compressed in the corner (Figure 8-12). On the observation day, the classroom students, the teacher, and some students from another classroom, all used the computers. The teacher used the computers during the class time, whilst the students used

them during the lunch break. As with the Northland classroom, some students were working on computers while others watched and commented.

FIGURE 8-9. COMPUTER AREA IN THE CLYDE QUAY CLASSROOM.

FIGURE 8-10. COMPUTER AREA IN THE THORNDON CLASSROOM.

129

FIGURE 8-11. COMPUTER AREA IN THE NORTHLAND CLASSROOM.

FIGURE 8-12. COMPUTER AREA IN THE ROSENEATH CLASSROOM.

THE SETTINGS IN RELATION TO THE MI THEORY.

The intelligences that may be involved in computer settings are logical-mathematical, linguistic, spatial, and intrapersonal intelligence. All four classrooms had the standard computer settings: computers, computer tables, and chairs.

The Clyde Quay classroom had an ink jet printer and data projector in addition to the standard settings. The Roseneath classroom had a data projector in the school. For linguistic intelligence (Table 8-1), except for the Clyde Quay and Roseneath classrooms, the classrooms needed printers for publishing students' work and writing. Although all the classrooms contained small stereos, they all lacked audio and video systems for listening and watching recorded materials or for giving and recording speeches and stories. In support of spatial intelligence (Table 8-4), the computers in the classrooms contained simple drawing software. These classrooms may need photography settings, such as cameras and photo printers. For intrapersonal intelligence (Table 8-3), none of the computer stations in the four classrooms provided privacy. These stations were located within the classroom settings where, in the four classrooms, there was not enough space for circulation around them.

TABLE 8-4: POSSIBLE DESIGN SETTINGS FOR SPATIAL INTELLIGENCE.

DESIGN SETTINGS:
AN ART AREA WITH TABLES AND CHAIRS (THERE COULD BE ONE OR TWO PAINTING STANDS)
A ROUND TABLE FOR GROUP CREATIVE WORK OR INDIVIDUAL WORK SUPPORTED WITH A WATER TAP (THERE COULD BE A POTTERY WHEEL)
CABINETS FOR STORING ART TOOLS AND MATERIALS ORDERED IN A COLOUR OR SIGNS SCHEME
PHOTOGRAPHY CORNER WITH PHOTO PRINTER AND COMPUTERS SUPPORTED WITH DRAWING AND ANIMATION SOFTWARE
A BUILDING CORNER WITH MOVABLE, FLEXIBLE OR BUILDABLE FURNITURE. BUILDING MATERIALS WITH WIDE RANGE OF COLOURS AND SHAPES

DISCUSSION AND RECOMMENDATIONS.

Teachers and students considered computer access important in the classroom. The central issue here is that computer use in these classrooms was hardly supported with technology tools, as the researcher suggested in the proposition. Nair and Fieliding (2005, 2007) claim that technology is a vital factor in a child's life. Children use technology in communication, discovering the world, and playing games, in addition to writing and reading. Nair and Fieliding (2005, 2007) suggest that classrooms with appropriate technology could help in the learning process. Moreover, according to Bergsagel et al. (2007), even in small schools, students and teachers should have access to computers and technological learning and communication tools for individuals or small groups. Hence, the importance of technology is obvious.

In the Northland school, according to the interviewed teacher, some classrooms were beginning to use interactive boards, which were still not available to the one studied. Also from the students' drawing exercises, it was evident that they would like more technology in their classrooms. Some asked for faster computers, laptops, interactive whiteboards, and iPads (Figure 8-13). Furthermore, there was the possibility for classrooms to be mainly dependent on laptops or personal electronic devices, such as iPads, which take no space in the classroom. This would make more room for other settings in the classroom, as there would only be a need for a small station for a printer/scanner machine.
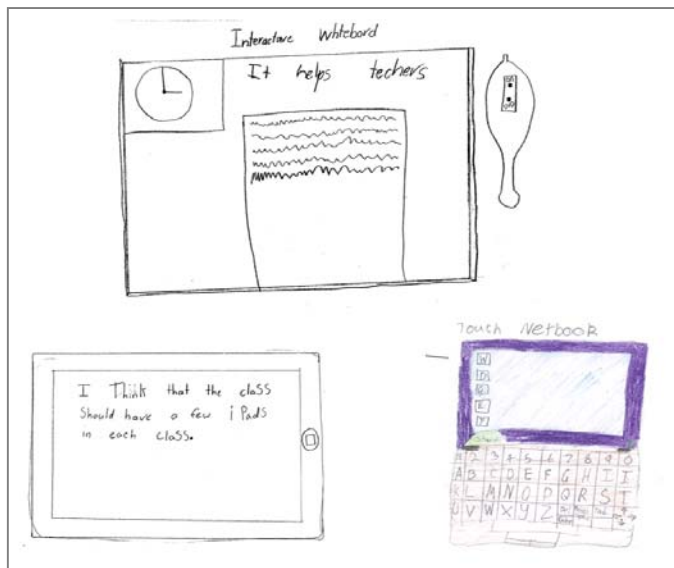
FIGURE 8-13. SOME OF THE THORNDON STUDENT DRAWINGS ABOUT COMPUTERS AND TECHNOLOGY INSIDE THE CLASSROOM.

8.1.3 ART, PROJECTS, AND BUILDING ACTIVITIES SETTINGS

Students and teachers were asked about where students work for art, project, and building activities and whether these settings were good or not.

In the Clyde Quay classroom, there was a small sink bench in one of the corners (Figure 8-14). There were some shelves near the computer area for storing tools and equipment for building activities (Figure 8-15), in addition to other shelves in the classroom for art and projects tools. Students confirmed that projects were completed on tables or outdoors, and that art activities were only completed on tables, with building activities done on both the tables and the mat. Students were negative about project settings and positive about art and building activity settings. However, students had issues with working on art and projects on tables. They claimed that the sink and the wet area were not used and that tables were too small for such activities.

The classroom teacher confirmed that art, projects, and building activities were completed at desks or on the floor, whereas some of the building activities were conducted outdoors. He considered these settings good for building activities and "okay" for art and projects, although he declared that there was no space inside the classroom to dry work or to store it. According to the researcher observation, the wet area was not used on the observation day. In addition, there was no art class or artwork on that day.

In the Thorndon classroom, a wet area contained a sink bench and an art table (Figure 8-16). Shelves for art, projects, and building activity tools were located around the classroom. Students confirmed that projects were completed on tables, computers, and in the library corner; art was completed on tables; and building activities in the library area or on the mat. Most students were positive about these settings for the three activities.

FIGURE 8-14. THE WET AREA IN THE CLYDE QUAY CLASSROOM.

FIGURE 8-15. SOME SHELVES FOR STORING TOOLS FOR BUILDING ACTIVITIES IN THE CLYDE QUAY CLASSROOM.

FIGURE 8-16. THE ART AREA IN THE THORNDON CLASSROOM.

One student claimed that tables are *"nice, hard and steady"* whilst another claimed that there was not enough space on tables for working on such

135

activities. The classroom teacher confirmed that art and projects were completed on either tables or outdoors, whilst building activities were completed in many places within the classroom, such as the sandpit, tables, mat, and the library corner. She was neutral about the existing art and project settings and positive about building activity settings. She suggested having a dedicated art classroom because there was not enough space in the classroom for all students to work on art at the same time.

According to the researcher observation, the wet area was used only during art classes. On the observation day, there was an hour-long art class. The art area was used at the beginning of the art class by three students and by the teacher to prepare the art tools for the rest of students. During the art class, every student was on their table, either standing or sitting on the chairs. At the end of the class, students used the sink to clean their hands and the tools. The art table was used just for the art tools; no one used it for drawing.

In the Northland classroom, there was no special space for art inside the classroom. There was a sink bench and some benches outside the classroom. Three classrooms shared this area (Figure 8-17). Inside the classroom, there were some shelves for art, projects, and building tools.

Students confirmed that art, projects and building activities were completed on the mat, desks, or outside the classroom. Students were positive about all the settings for these three activities, although they had some issues. Students complained that there was not enough space on desks for working on projects, but that they liked to work near their desk, as all the information and tools they may need were there. They said that sometimes, when working on the carpet, the blocks would fall over.

The teacher confirmed that art and projects were completed either at desks or on the benches outside the classroom, whereas building activities were completed on the mat. The teacher was negative about the art

settings, neutral about project settings, and positive about building activity settings. She complained that there was no wet or sink area in the classroom for cleaning up. According to the researcher observation, on the observation day, students had an art class for an hour and a half. Students were working on their desks and when they needed the sink, they went outside the classroom to use the sink bench.

FIGURE 8-17. THE ART AREA OUTSIDE THE NORTHLAND CLASSROOM.

FIGURE 8-18. THE WET AREA IN THE ROSENEATH CLASSROOM.

In the Roseneath classroom, there was a small sink area in one of the corners, in addition to some shelves for art, projects, and building tools (Figure 8-18). Students confirmed that projects were completed at their desks, on the computers, the mat, or outside; art was completed on tables; and building activities on the mat. Most students were neutral about project settings and positive about the art and building activity settings. One student considered the mat bad for working on projects, as it was difficult to keep track of personal items, whilst another student stated that students had enough space on the mat for working on projects. However, for building activities, they said that the blocks fell over when working on the carpet. Students complained that the desks were too small for art activities.

The classroom teacher claimed that art, projects and building activities were completed either on the mat or at desks. The teacher was neutral the settings on terms of suitability for art and projects, and had a positive view when it came to using them for building activities. She would have

preferred to have large tables instead of desks. She declared that students seemed to prefer the mat to desks when working on such activities.

During the researcher observation, students did not have an art class. However, one student drew in his free time. He used his desk for drawing and the sink to wash his tools (Figures 8-19, 20). In general, the sink was used for washing hands at the lunch break, in addition to the art purposes.

FIGURE 8-19. A STUDENT DRAWING AT HIS DESK IN THE ROSENEATH CLASSROOM.

FIGURE 8-20. THE SAME STUDENT USING THE SINK IN THE ROSENEATH CLASSROOM.

THE SETTINGS IN RELATION TO MI THEORY.

The intelligences that may be involved in art, projects, and building activities settings are spatial, bodily-kinaesthetic, and logical-mathematical. For spatial intelligence (Table 8-4), all classrooms, except for Northland, had a dedicated art area. However, in the Roseneath and Clyde Quay

classrooms, the art area only contained a small sink bench. There was no special table for art group work. In all classrooms, there were some tools for building activities, but there was no special corner or areas dedicated to these activities.

For bodily-kinaesthetic intelligence (Table 8-5), these classrooms did not have settings for creative hands and art projects. Projects were completed on different settings in the classrooms. For logical-mathematical intelligence, the classrooms also needed places for science work and projects and some settings for displaying students work and achievements.

TABLE 8-5: POSSIBLE DESIGN SETTINGS FOR BODILY-KINAESTHETIC INTELLIGENCE.

POSSIBLE DESIGN SETTINGS FOR BODILY-KINAESTHETIC INTELLIGENCE
A ROUND TABLE FOR CREATIVE HANDS SUPPORTED WITH SOME MATERIALS, SUCH AS CLAY AND BLOCKS
A LARGE EMPTY SPACE INSIDE THE CLASSROOM WITH COMFORTABLE FLOORING (CARPET FOR EXAMPLE) FOR FREE PHYSICAL ACTIVITIES AND CREATIVE MOVEMENTS
A MINI STAGE FOR PERFORMING
A CORNER FOR SPORTS WITH CABINETS FOR STORING SPORT TOOLS
DIFFERENT TEXTURES AND MATERIALS APPLIED TO FURNITURE AND WALLS INSIDE THE CLASSROOM

DISCUSSION AND RECOMMENDATIONS.

The main issue in art and projects settings is that most of the work was completed on small desks or tables, even though classrooms had an art area. The classrooms need a large surface area for such activities. Large tables or group of desks could be used as art tables if some extra surface area, such as more tables or desks, were added. A movable layer for painting and dirty work could cover them. This layer could be a setting by itself. It could be an art table from one side supported with movable legs for art time, and a whiteboard from the other side for teaching time. In addition, some students, such as in the Roseneath classroom, like to paint or draw in their spare time. Thus, the classroom should be ready for these activities. The art area should be supported with art table and art tools for drawing and painting in other classes (Figure 8-21).

The other issue relates to the building activities. Due to the problem of falling blocks on the carpet, it is better for classrooms to have a special mat for building activities. This mat could also be movable and multi-purpose. Issues about storage units are discussed in the next sections.

FIGURE 8-21. A DRAWING FROM ONE STUDENT IN THE CLYDE QUAY CLASSROOM SHOWS A NEED FOR AN ART TABLE IN THE ART AREA.

8.1.4 MUSIC AND DRAMA SETTINGS

The questions about drama and music enquire whether these students play music and drama inside the classroom; if there is a special space to listen to music; and if these settings are good.

None of the studied classrooms had special settings for music and drama, except that in the Thorndon classroom, where there was a box full of drama materials near the library corner and the mat. There was a CD player in one corner of all the classrooms. Students in three classrooms confirmed that they did not play music or drama inside the classroom. However, some of Thorndon's students said that drama was practiced inside the classroom on the mat area.

In the Clyde Quay classroom, students declared that music playing was confined to singing on the mat and that there was not enough space for all students. Students stated that they listened to music while cleaning and tidying the classroom.

The teacher stated that students played music in the hall, not in the classroom. He also declared that students listened to music on the classroom mat. According to researcher observation, there was no music on the observation day.

In the Thorndon classroom, students stated that students had music lessons in the music room. Students confirmed that they listened to music in the stereo area (within the mat area), or when they were working or painting. Students were neutral about the drama settings and suggested creating a special area just for drama.

The teacher stated that students played music inside the classroom, either on the computers or by playing guitar and singing. She considered these settings "okay" because, at times, the sound was "too loud for others." The teacher declared that students listened to music in the classroom from a little CD player in front of the classroom (the mat) (Figure 8-22).

On the observation day, about six girls were listening to music and dancing on the mat during the lunch break. In addition, the teacher turned on the stereo for students to listen to music while painting and working in the art class. For drama, one girl was enjoying her lunch break, putting on different costumes and acting according to these costumes.

FIGURE 8-22. THE STEREO AREA IN THE THORNDON CLASSROOM.

In the Northland classroom, students stated that some members in the music club played music in the hall, whilst the rest of the class listened to music and sang anywhere inside the classroom. The teacher confirmed that students played music at desks or on the carpet and that these settings were "okay." She declared that students listened to music anywhere inside or outside the classroom. According to the researcher observation, there were no music or drama activities on the observation day.

In the Roseneath classroom, students confirmed that they had music lessons in a music room. Some students stated that they listened to music with or without headphones inside the classroom. According to the teacher, students played music on the mat and that the mat was "okay" for such an activity. She stated that students listened to music, but not in the classroom, as they had a music room in the school. According to the researcher observation, there was no music or drama on the observation day.

THE SETTINGS IN RELATION TO MI THEORY.

Musical and bodily-kinaesthetic intelligence might be involved in music and drama settings. The four classrooms lacked a group of settings for these two intelligences. For bodily- kinaesthetic intelligence (Table 8-5), only one

of the classrooms contained a dedicated setting, such as a mini stage for performing, dancing, or drama. In the Thorndon classroom, although there were some materials for drama, students would have liked to have a corner or a place for performing.

For musical intelligence (Table 8-6), in addition to the mini stage or performance corner, the classrooms need a centre for music and music files. There could be a special table with headphones to listen to music without bothering other students. Classrooms may need a space for an audience, so that students can listen and watch each other playing music or performing.

TABLE 8-6: POSSIBLE DESIGN SETTINGS FOR MUSICAL INTELLIGENCE.

DESIGN SETTINGS:
A LARGE ROUND TABLE WITH CD PLAYERS AND HEADPHONES IN THE CENTRE
A MINI STAGE FOR SINGING AND PLAYING MUSIC FOR THE CLASS
CUSHIONS AND SOFT FLOOR SEATING FOR THE REST OF STUDENTS
CABINETS FOR MUSIC FILES AND INSTRUMENTS
A TABLE FOR WRITING AND DISCUSSING MUSIC NOTES AND LYRICS
A GROUP OF BUTTONS ON A WALL GIVE SOME SOUND EFFECTS AND VOICES
PRIVATE NOOKS FOR PRIVATE SOUND RECORDING
VIDEO AUDIO SYSTEM

DISCUSSION AND RECOMMENDATIONS.

There are some issues with the music and drama activities. All classrooms need some space for performing and dancing. This could be a mini stage for a large classroom or just a difference in flooring materials or colours in small classrooms. Nair and Fielding (2005, 2007) stated that music and drama should be an integral part of the curriculum. They claimed that music and math have strong link, and that in addition, drama and performance are perhaps the best way to learn literature. Therefore, even though there are music rooms in the school, there is a need for some music and drama settings inside the classroom for learning other subjects (Figure 8-23). For loud music inside the classroom, there should be a number of headphones so that the music does not disturb other activities.

FIGURE 8-23. A DRAWING FROM ONE OF NORTHLAND STUDENTS OF A DIDGERIDOO (A MUSIC INSTRUMENT), WHICH INDICATES THAT SOME STUDENTS WOULD LIKE TO HAVE SOME MUSIC SETTINGS INSIDE THE CLASSROOM.

8.1.5 PHYSICAL ACTIVITIES INSIDE THE CLASSROOM

For physical activities, students and teachers were asked about where students exercise. In the four classrooms, there were no special settings for physical activities. Students of all four classrooms confirmed that they exercised outside the classroom, and some students said that they exercised inside the classroom when it was raining. The Clyde Quay and Northland classroom teachers stated that students only exercised outside the classroom, whilst the Roseneath and Thorndon classroom teachers confirmed that students also exercised inside the classroom.

On the observation days, all exercise activities took place outside the classrooms. However, in the Roseneath classroom, students exercised for five minutes inside, and in the Thorndon classroom, during the lunch break, boys played with balls inside the classroom. Girls danced and other students played everywhere: inside the classroom, outside, and in the classroom garden.

145

THE SETTINGS IN RELATION TO MI THEORY.

Bodily-kinaesthetic intelligence might be involved in exercise activities (Table 8-5). All four classrooms had the mat area, which could be very good for free physical activities and creative movement. However, classrooms missed a sports corner for tools and equipment that could support a wider range of physical activities.

DISCUSSION AND RECOMMENDATIONS.

According to the findings, students exercised inside the classroom if it was raining. In the Thorndon classroom, students played and ran around the classroom during the class break times. The Thorndon teacher noted that she would like the classroom to be suitable for playing, especially as the students spend most of the time inside the classroom. Furthermore, boys expressed a desire for settings related to sports (Figure 8-24). Therefore, ideally, the classrooms could be ready for physical activities with some special settings. There could be a space for exercise, finished with soft materials on the walls and the floor. The classroom could contain some bars suspended from the ceiling or hung on walls to encourage students to work out during classes. The floor could be decorated as a sports field or dance floor to encourage and motivate students to do some physical activities within the classroom.

FIGURE 8-24. A DRAWING FROM A BOY FROM THE CLYDE QUAY CLASSROOM, SHOWING HOW HE WOULD LIKE TO HAVE SETTINGS RELATED TO SPORTS INSIDE THE CLASSROOM.

8.1.6 NATURAL SETTINGS

In relation to natural settings, students and teachers were asked whether or not students learned subjects with real animals and plants and enquired about having classes outdoors. All the teachers, except the Northland teacher, confirmed that they used living creatures for learning and teaching inside the classroom. The teachers confirmed that they sometimes gave classes outdoors, but the Clyde Quay teacher said that he usually took students outdoors to have classes there. All students and teachers enjoyed taking care of plants and pets.

In the Clyde Quay classroom, a small fish tank on the sink bench and some planters near one of the windows represented the natural settings (Figures 8-25 and 8-26). Most students confirmed that they sometimes learned with real living creatures. Occasionally, students used plants for sketching and drawing. Students said that they rarely had classes in nature.

In the Thorndon classroom, there was a classroom garden with direct access from the classroom. This garden contained a sandpit, plant boxes, and gardening tools (Figure 8-27). In addition, there was a small planter inside the classroom near one of the windows (Figure 8-28). Students said that

147

they hardly learned with real animals or plants and confirmed that they had some classes in nature. Even though the classroom did not have a "classroom pet," the teacher claimed that students sometimes brought pets from home and shared them with others.

In the Northland classroom, there was no natural setting inside the classroom. Most students confirmed that they did not use real animals or plants in learning. They stated that they rarely had classes in nature. In the Roseneath classroom, there was no natural setting inside the classroom. Most students stated that they did not learn with real living creatures and they did not have classes in nature.

FIGURE 8-25. A FISH TANK IN THE CLYDE QUAY CLASSROOM, ONE OF THE NATURAL SETTINGS IN THE CLASSROOM.

FIGURE 8-26. SOME PLANTERS IN THE CLYDE QUAY CLASSROOM.

FIGURE 8-27. THE CLASSROOM GARDEN IN THE THORNDON CLASSROOM. THE CLASSROOM IS ON THE RIGHT AND A NEIGHBOUR'S BUILDING IS ON THE LEFT.

FIGURE 8-28: A PLANTER IN THORNDON CLASSROOM, ONE OF THE NATURAL SETTINGS.

On the observation day, there was no activity related to natural settings during class time, except in the Thorndon classroom, when at morning tea or lunch break, some students went to the classroom garden to play and take care of their plants and vegetables.

THE SETTINGS IN RELATION TO MI THEORY.

Naturalist intelligence might be involved in the natural setting (Table 8-7). Only the Thorndon classroom had a garden. The Clyde Quay classroom contained small natural settings. Although these two classrooms contained some natural settings, they also needed some settings inside the classroom, as did the other two classrooms. Learning with real animals and plants needs a centre for discovering these creatures. There could be a microscope, some laboratory tools, and some gardening tools, in addition to access to the outdoors.

TABLE 8-7: *POSSIBLE DESIGN SETTINGS FOR NATURALIST INTELLIGENCE.*

DESIGN SETTINGS:
A COUNTER WITH HIGH CHAIRS FOR DISCOVERING ABOUT ANIMALS AND PLANTS
A ROUND TABLE FOR DISCUSSING AND INVESTIGATING LIVING CREATURES AND URBAN OBJECTS, SUPPORTED BY A COMPUTER
ACCESS TO THE OUTDOORS

DISCUSSION AND RECOMMENDATIONS.

Natural settings could be divided into outdoor and indoor settings. For outdoor settings, classrooms may not have to contain a private classroom garden, like the one at the Thorndon classroom. Access to any outdoor settings could be enough. All four classrooms were in schools that have playgrounds, a playing field, and/or court. The issue is whether these places are used for learning and teaching. According to researcher observation, none of the classrooms used an outdoor natural setting for learning, except for the Thorndon students, who were playing and taking care for the plants in the classroom garden during lunchtime. The Thorndon classroom garden gave students and the teacher a great opportunity to learn about nature.

Nair and Fieliding (2005, 2007) suggest that outdoor settings allow other kinds of learning to take place that could not occur inside classrooms. The outdoor space is excellent for large and messy projects, for gardening, taking care of animals, and for children to play. In other words, teachers should benefit from every setting they can access readily, inside or outside the classroom. For indoor settings, there is no need to convert the classroom to a biology laboratory. The discovery centre could be within the art area, using the same sink, benches, and tables. It just needs some tools, classroom pets, and some plants to help students in learning subjects related to living creatures (Figures 8-29 and 8-30).
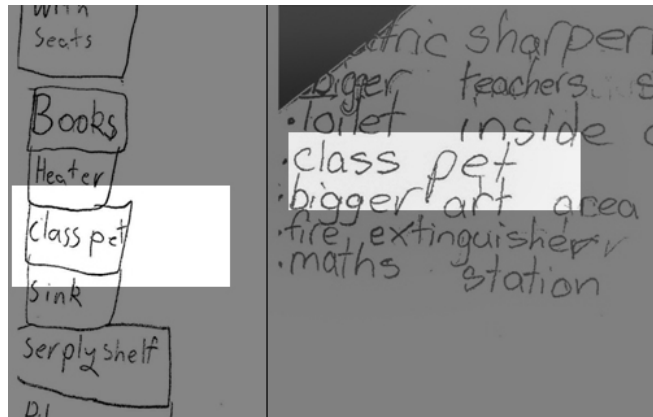
FIGURE 8-29. TWO OF THORNDON STUDENT' LISTS OF A FUTURE CLASSROOM THAT SHOW THAT THEY WOULD LIKE TO HAVE A CLASS PET INSIDE THE CLASSROOM.

FIGURE 8-30. A DRAWING BY A STUDENT FROM THE CLYDE QUAY CLASSROOM THAT INDICATES THAT SOME STUDENTS WOULD LIKE TO HAVE LIVING CREATURES INSIDE THE CLASSROOM.

8.1.7 TEACHER'S SETTINGS

Teachers were asked about the location of their special settings in their classrooms and whether these settings were good. All classrooms except the Roseneath Classroom contained a teacher's station, which included a teacher desk, chair, and some storage units. The Roseneath Classroom included only a teacher desk and chair. Teachers' stations were all located near a window (Figures 8-31 to 8-34). There was a chair for the teacher in the mat area next to the whiteboard in each classroom, except for the

Northland classroom, as the teacher's desk and chair were already next to the mat and the whiteboard (Figures 8-35 to 8-37).

In the Clyde Quay Classroom, the teacher claimed that the area was "okay," although he would have liked more storage. The researcher noticed that the teacher's area was messy and confirmed that it needed more storage. On the observation day, the teacher used his chair in the mat area more than at the desk.

In the Thorndon classroom, the teacher confirmed that her workstation was very good. On the observation day, the teacher, in addition to one student who needed to work alone, used the teacher's desk. Students were not allowed to enter the storage room without the teacher's permission. The teacher used both the mat chair and her desk almost equally.

In the Northland classroom, the teacher considered her area "good." On the observation day, only the teacher used the teacher's area. The same teacher's chair was used for both the teacher's area and the mat area, as these areas were next to each other.

In the Roseneath classroom, the teacher considered her area "okay." She claimed that she would have liked some shelves in her area. She did not "believe" that the teacher's area should be visible. On the observation day, the chair in the mat area was used more than the teacher's desk.

THE SETTINGS IN RELATION TO THE MI THEORY.

Most of the intelligences from MI theory, if not all, are involved in teacher's settings. Teachers could take a part in any activity and use any setting with students inside the classroom (Table 8-8). All teachers had a special station in their classrooms to work and supervise students. There were other settings in the classrooms for the teachers to use, such as whiteboards, chairs in the mat areas, and storage units. In the four classrooms, some

teachers had their own laptops, but as the researcher noticed, they were not linked to the classroom computers.

FIGURE 8-31. THE TEACHER'S AREA IN THE CLYDE QUAY CLASSROOM.

FIGURE 8-32. THE TEACHER'S AREA IN THE THORNDON CLASSROOM.

FIGURE 8-33. THE TEACHER'S AREA IN THE NORTHLAND CLASSROOM.

FIGURE 8-34. THE TEACHER'S AREA IN THE ROSENEATH CLASSROOM.

FIGURE 8-35. THE TEACHER'S CHAIR IN THE MAT AREA IN THE CLYDE QUAY CLASSROOM.

FIGURE 8-36. THE TEACHER'S CHAIR IN THE MAT AREA IN THE THORDON CLASSROOM.

FIGURE 8-37. THE TEACHER'S CHAIR IN THE MAT AREA IN THE ROSENEATH CLASSROOM.

TABLE 8-8: POSSIBLE DESIGN SETTINGS FOR TEACHERS ACCORDING TO THE MI THEORY.

DESIGN SETTINGS:
CONTROLLING CENTRES WHERE THEY CAN SEE, HEAR, AND MONITOR ALL STUDENTS IN THE CLASSROOM
A COMPUTER CONNECTED TO ALL OTHER COMPUTERS IN THE SAME ROOM
A SPACE FOR DISCUSSING TOPICS AND SUBJECTS
A SPACE TO MEET WITH STUDENTS INDIVIDUALLY OR IN GROUPS
A WHITE OR BLACK BOARD FOR THE DAILY SCHEDULE
SOME CABINETS TO STORE SOME TOOLS FAR AWAY FROM STUDENTS

DISCUSSION AND RECOMMENDATIONS.

It was noticeable that in the four classrooms, the teacher's area was next to a window. It could be either because there was good daylight near the window during the school day, the area would be warm because of sunshine, or so the teacher can supervise the students outside the classroom. However, the last reason only applied to the Thorndon and Northland classrooms, as in the other classrooms the teacher's desk were next to windows with views to outside the schools.

The teachers' desks were not located in all classrooms with the aim to control the class. In the Clyde Quay classroom, the teacher's desk was facing the window instead of the classroom (Figure 8-38). In the Thorndon classroom, the desk was located far away from the mat area. The teacher could control students at desks easily, but could not do so for students in the mat or library areas (Figures 8-39). In the Roseneath classroom, the desk was positioned behind a steel column, facing half of the classroom, and the other half was behind the teacher's back (Figures 8-40). Only in the Northland classroom could the teacher supervise students from her desk, regardless of where they were inside the classroom (Figures 8-41).

During teaching time, teachers used the chair in the mat area while students sat on the floor. It could be so that the teacher is seated at a higher level to control the students, and so that all students could see the teacher clearly. It could also be that it is uncomfortable for the teacher to sit on the floor. Teachers used their desks generally when students worked at their desks. Other related issues are discussed in different sections in this chapter.

FIGURE 8-38. TEACHER'S SUPERVISION ZONE FROM THE TEACHER'S DESK IN THE CLYDE QUAY CLASSROOM.
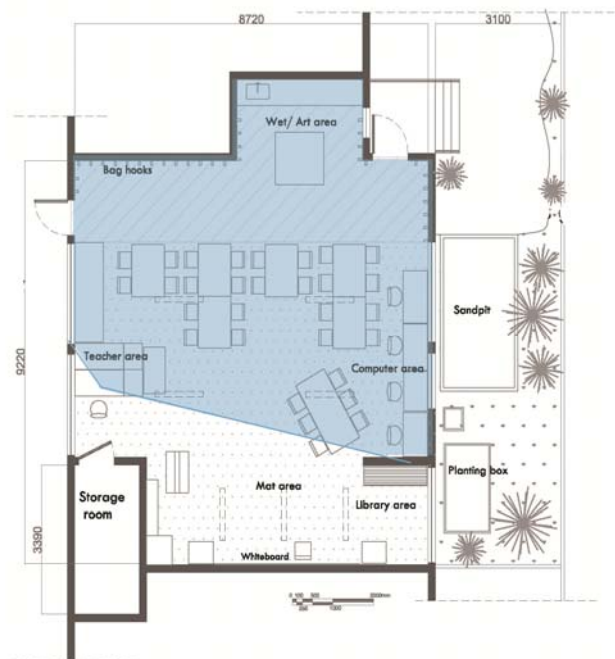
FIGURE 8-39. TEACHER'S SUPERVISION ZONE FROM THE TEACHER'S DESK IN THE THORNDON CLASSROOM.
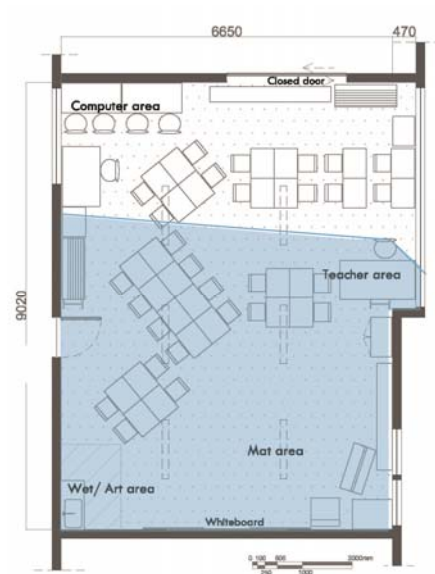
FIGURE 8-40. TEACHER'S SUPERVISION ZONE FROM THE TEACHER'S DESK IN THE ROSENEATH CLASSROOM.
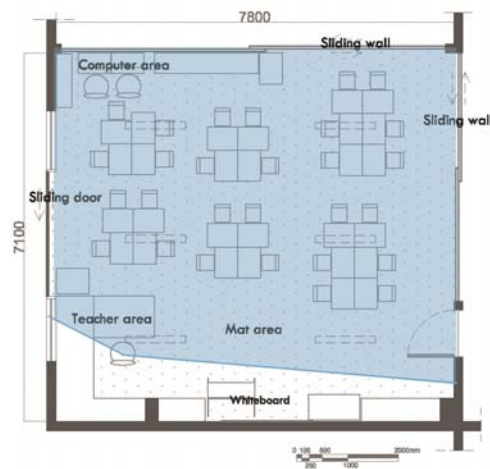
FIGURE 8-41. TEACHER'S SUPERVISION ZONE FROM THE TEACHER'S DESK IN THE ROSENEATH CLASSROOM.

8.1.8 STORAGE IN THE CLASSROOM

For an investigation about storage, students and teachers were asked about whether they had enough storage units in their classrooms, if the facilities were good, and if the students could access what they needed from the storage units.

159

The four classrooms contained a group of storage units that included shelves, cabinets, bookshelves, and lockable station (Figures 8-42 to 8-45). Bag hooks were located outside the classroom in three classrooms. In the Roseneath and Northland classrooms, the bag hooks were in the indoor corridor next to the classroom, while in the Clyde Quay classroom, the bag hooks were on the deck outdoors (Figures 8-46 and 8-47). In the Thorndon classroom, the bag hooks were located in the wet area inside the classroom (Figure 8-48).

All the students, except those from the Thorndon classroom, confirmed that there were enough storage units. Students at the Clyde Quay and Thorndon confirmed that they could always access what they needed from shelves, whilst students of the two other schools could do that most of the time. Students stated that there were enough storage units in the classroom, except the Thorndon students, who said that the units were old, small, and that there were not enough.

At Clyde Quay, some students were positive about the condition of storage units, whilst others were negative. Students complained that there was no space for large items and that the classroom needed art storage units. They said that shorter students had to use chairs to reach higher shelves. The teacher stated that the storage units were good, but more were needed. He also said that there was no key for the lockable station. On the observation day, students were removing and putting items on shelves easily. However, the cabinet was not used that day.

At Thorndon, students confirmed that the items they could not reach were those that were meant to be inaccessible. The teacher also confirmed that the classroom needed more storage. She claimed that the library shelves were old and unsuitable and that the students' trays were very small. The researcher observation confirmed that the classroom needs more storage. The storage room was full of large materials. There were some shelves in the room, but these were not big enough for the materials stored on them.

The teacher noted that she did not allow students to enter this room because she was worried that something could fall and hurt somebody.

At Northland, students were positive about these units. The teacher stated that the classroom needed more storage units and that the existing units were just "okay." According to the researcher observation, the classroom was full of items and materials. However, there were some empty, unused shelves in the classroom (Figure 8-49).

At Roseneath, students were positive about the condition of the units. They stated that they could not reach the shelves that were for the teacher only. The teacher confirmed that the classroom needed more storage. She considered the existing units inadequate, as the "shelves are too deep or shallow" and some of the units were old and hard to move. She also claimed that there was no lockable station for the items that students should not reach. The researcher also confirmed that the classroom needed more storage units.

FIGURE 8-42. SOME SHELVES AND STUDENTS' BOXES IN THE CLYDE QUAY CLASSROOM.

FIGURE 8-43. SOME SHELVES IN THE THORNDON CLASSROOM.

FIGURE 8-44. SOME STORAGE UNITS IN THE NORTHLAND CLASSROOM.

FIGURE 8-45. A CABINET AND BOOKSHELVES IN THE ROSENEATH CLASSROOM.

FIGURE 8-46. THE BAG HOOKS IN THE INDOOR CORRIDOR OUTSIDE THE NORTHLAND CLASSROOM.

FIGURE 8-47. THE BAG HOOKS IN THE INDOOR CORRIDOR OUTSIDE THE ROSENEATH CLASSROOM.

FIGURE 8-48. THE BAG HOOKS INSIDE THE THORNDON CLASSROOM.

FIGURE 8-49. FREE SPACE ON SOME SHELVES IN THE NORTHLAND CLASSROOM.

THE SETTINGS IN RELATION TO THE MI THEORY.

Storage settings are involved in almost all the eight intelligences. Each intelligence may need a unit or more for storing the tools used in related activities. For example, for linguistic intelligences, the classroom needs bookshelves for reading activities, and for musical intelligences, the classroom may need a cabinet for music instruments and tools.

DISCUSSION AND RECOMMENDATIONS.

For storage settings, all teachers claimed that they needed more storage units. However, there was no room for more units. In the Thorndon classroom, although there was a storage room, both students and the teacher claimed that they needed more storage units. The issue here is that not all materials should be available for students. Actually, some materials should not be within students' reach. Thus, storage units could be divided to student and teacher-only storage. All classrooms, except the Roseneath classroom, contained lockable stations. The teacher in the Clyde Quay classroom did not have a key for the lockable station. Another issue that arose from the students' interviews was that, in some classrooms, students could not reach higher shelves, thus the teacher used them for items that needed to be out of reach. This could be an idea for other units. Although there is little room in classrooms for new units, the space above the shelves and below storage units was free. Higher shelves or lockable cabinets could be installed above the old units for items and materials students do not need daily.

8.2 WORKING SITUATIONS

In order to explore different working situations, students and teachers were asked how often students worked in groups and where; where could students could work alone or individually; where the whole class sat together and learned.

8.2.1 GROUP WORK

The researcher observation revealed that there were no special settings for group work, in the four classrooms. However, in the Thorndon classroom, there was the library area, where a group of up to six students could sit together and work. Whilst students at Thorndon said they usually worked in groups, in other schools, students confirmed this happened only sometimes. All students stated that group work was completed either on students' tables or on the mat.

In the Clyde Quay classroom, the teacher stated that students usually worked in groups, and that group work took place at desks, on the mat, on the deck, or in the playground. Twenty-percent of the class time was spent on working in large groups. On the observation day, students worked in five groups on tables and one group was on the mat for about 45 minutes (Figure 8-50).

In the Thorndon classroom, the teacher claimed that 0.4% of the class time was spent on working in large groups. On the observation day, there was no obvious group work during classes. However, two students worked together in the library corner for a while.

In the Northland classroom, the teacher claimed that students usually worked in groups either at desks or on the carpet. On the observation day, there were no noticeable group tasks or work.

In the Roseneath classroom, the teacher claimed that students worked in groups for many of the tasks. She claimed that 20% of the class time was spent working in large groups. On the observation day, there was some group work on the mat. The researcher noticed that the mat was too small for all students to work in groups at the same time.

THE SETTINGS IN RELATION TO THE MI THEORY.

Interpersonal intelligence might be the intelligence most involved in group working settings. This intelligence is best utilised when working with others, irrespective of the settings. It needs a place for students to gather, in groups or all together, to have discussions, speeches, or any other learning task. It may need a table or a corner just for group work. On this table, individual work should not be allowed in order to encourage students to work together. All students would share information, discuss, and suggest new ideas with others. In the four classrooms, group work happened almost anywhere, but mostly on the mat or on the tables. There were no special settings for interpersonal intelligence.

Other intelligences could be involved, such as linguistic and natural intelligences, but their needs for group working are almost the same settings as for interpersonal intelligence needs.

DISCUSSION AND RECOMMENDATIONS.

The Thorndon classroom teacher claimed that group work was very important in New Zealand schools and that co-operative work was encouraged in the classroom. Nair and Fieliding (2005, 2007) state that collaborative work is important for social skills, which are vital for success in almost any profession.

Yet, little group work was evidenced in observation. In the four classrooms, group work was completed mainly on tables or on the mat. In most schools, the mat was not big enough for all students to work in groups all at once. Students' tables and desks were used for both individual and group work. Students may not be interested in working with others, especially if it required having to share personal space and items with others (Figure 8-51). Group work does not require a table or a specific place. It could be completed on a group of different settings, such as benches, tables, soft floor seating, or mats. These settings need to be readily available to encourage students to engage in collaborative work. For example, settings,

such as tables or side shelves, could be supported with games and tools that need more than one person to operate.

FIGURE 8-50. STUDENTS WORKING IN GROUPS ON THEIR TABLES IN THE CLYDE QUAY CLASSROOM.

FIGURE 8-51. GROUP TABLES IN STUDENTS' DRAWINGS INDICATE THAT STUDENTS ARE INTERESTED IN GROUP WORK. THE STUDENTS WERE FROM THE CLYDE QUAY AND NORTHLAND CLASSROOMS.

8.2.2 INDIVIDUAL WORK

In each classroom, except the Thorndon classroom, there was a single desk and a chair, separated from other student's desks, where students could work alone. In the Thorndon classroom, students had the library corner, which could be a place for working alone.

In the Clyde Quay classroom, students said that there was no special space for individual working. Students worked individually on their tables with other students. The teacher confirmed that students could work individually on a single desk, on the teacher's desk, or on the deck. The teacher stated that 30% of the class time was spent working individually or in small groups. On the observation day, students were working individually on group tables (Figure 8-52). One student was working on the computer alone, without other students sharing the same setting.

In the Thorndon classroom, students stated that individual work could be completed on the mat, in the library area, or on students' tables. The teacher confirmed that students could work alone on a single desk, at the teacher's desk, mat, or in the library area. She stated that 40% of the class time was spent working individually or in small groups. On the observation day, one student was working on the teacher's desk as he needed to work alone (Figure 8-53).

In the Northland classroom, students confirmed that they worked individually at their desks or anywhere else, and that there was no special place for working alone. The teacher claimed that students worked alone on a single desk, the teacher's desk, or in the withdrawal room.[12] On the observation day, students worked individually at grouped desks with other

---

[12] The withdrawal room is a room outside Northland classroom shared with two other classrooms and used for working in groups or alone.

students (Figure 8-54). The researcher did not notice any student working alone without sharing the setting with other students.

In the Roseneath classroom, students confirmed that they worked on a single desk when they wanted to work alone. The teacher claimed that students could work alone on a single desk, the teacher's table, or on the mat. Fifty percent of the class time was spent on individual work and in small groups. On the observation day, students were working individually either on grouped desks or on the mat (Figure 8 -55).

FIGURE 8-52. INDIVIDUAL WORK IN THE CLYDE QUAY CLASSROOM.

FIGURE 8-53. INDIVIDUAL WORK IN THE THORNDON CLASSROOM.

FIGURE 8-54. INDIVIDUAL WORK IN THE NORTHLAND CLASSROOM.

FIGURE 8-55. INDIVIDUAL WORK IN THE ROSENEATH CLASSROOM.

THE SETTINGS IN RELATION TO THE MI THEORY.

Intrapersonal intelligence might be involved in individual working settings the most. For this intelligence (Table 8-3), students need a place where they can work, think, and plan alone. That could be a study carrel, computer corner, or a secret place. In these classrooms, only the Thorndon classroom had a semi-private place: the library corner. In the other classrooms, students shared settings with others most of the time even if they wanted to work alone.

DISCUSSION AND RECOMMENDATIONS.

In each classroom, there were a large number of students (28-30 students), and there was a possibility that some students preferred to work alone some times (Figure 8-56). Classrooms need to offer students different options. Each classroom could offer a private area for working privately, such as a tent or just a suspended screen from the ceiling that offers some privacy. Individual work could occur while working with others, but it is hard to assume that all students can work individually within a group of students. The four classrooms contained few or no settings for working alone and relied on the group tables or grouped desks for students' individual work. Nair and Fielding (2007, p. 67), claimed that learning environments need, *"spaces for individual study, reflection, quiet reading and creative flow,"* and that not all private learning spaces need to be quiet. They propose that these could be an outdoor area or a bench next to the window, and that it is important to create a variety of nooks and private corners for students to work with a physical sense of separation within learning environments.

FIGURE 8-56. A DRAWING BY A CLYDE QUAY STUDENT THAT SHOWS THAT SOME STUDENTS WOULD PREFER TO HAVE INDIVIDUAL SEPARATE DESKS RATHER THAN GROUP TABLES.

8.2.3 WHOLE CLASS TEACHING

For whole classroom teaching, there were mat areas and students' desks in the four classrooms. Students and teachers of all the classrooms confirmed

that most of the teaching for the entire class was completed on the mat. The Northland teacher confirmed that teaching was also delivered to students at desks.

In the Clyde Quay classroom, some students complained about the size of the mat and that the class needed more free space. The teacher stated that 30% of the class time was spent on teaching the class as a whole. On the observation day, almost all the teaching was completed on the mat (Figure 8-57).

In the Thorndon classroom, the teacher claimed that 45% of the class time was spent on teaching the whole class. On the observation day, the teaching took place mainly on tables and on the mat. The mat was used for gathering and learning all together (Figure 8-58).

In the Northland classroom, on the observation day, the teaching was completed either on the mat or at the desks. The classroom gathering was mainly on the mat, but some students preferred to sit on chairs even though most were sitting on the mat (Figure 8-59).

In the Roseneath classroom, the teacher claimed that 20% of the class time was spent on whole class teaching. On the observation day, most of the students' gathering and teaching was completed on the mat (Figure 8-60).

FIGURE 8-57. MAT TIME IN THE CLYDE QUAY CLASSROOM.

FIGURE 8-58. MAT TIME IN THE THORNDON CLASSROOM.

FIGURE 8-59. MAT TIME IN THE NORTHLAND CLASSROOM.

FIGURE 8-60. MAT TIME IN THE ROSENEATH CLASSROOM.

THE SETTINGS IN RELATION TO MI THEORY.

Whole class teaching involves all MI intelligences, although each intelligence needs special settings for learning and teaching as discussed in previous sections. The same settings can serve for teaching and instructions.

DISCUSSION AND RECOMMENDATIONS.

In the four classrooms, whole class teaching occurred primarily on the mat. In two of these classrooms, the students' tables were also used for this purpose. The main issue about the mat is that in most classrooms, it was not big enough for all the students to work on at the same time. In other words, classrooms would benefit from more free space.

In Figure 8-61, the graph indicates that in the four classrooms, the furniture occupies about 30-40% of the classroom area. The furniture free space could be used up to its maximum by using foldable and movable furniture to enlarge the mat area. Another issue is that students spend a long time on the mat. In the four classrooms, the flooring material in the mat area is carpeted, along with other areas of the classroom. This carpet could be made more comfortable for seating by having a softer carpet in the mat area, together with some cushions, or beanbags (Figure 8-62).
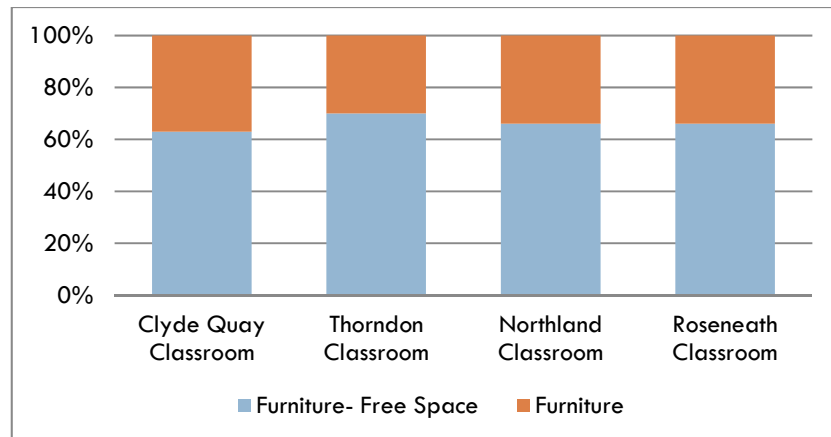
FIGURE 8-61. THE FURNITURE-FREE AREAS IN THE FOUR CLASSROOMS.

FIGURE 8-62. STUDENT'S DRAWINGS CONFIRM STUDENTS' NEEDS FOR FURRY RUGS AND SOFT CUSHIONS IN THE MAT AREA. DRAWINGS ARE FROM THE CLYDE QUAY AND THORNDON CLASSROOMS.

8.3 AESTHETICS AND EXISTING DESIGN ELEMENTS

The teacher's questionnaire and student's interviews included questions about lighting, colours, textures and materials, heating, and acoustics. These questions are about whether students and teachers like their classroom colours; whether the lighting in the classrooms is good for reading and writing; if the heating inside classrooms is good; if students can hear each

other clearly inside their classrooms; and how many materials and textures students can recognise in their classrooms.

8.3.1 COLOURS INSIDE THE CLASSROOM

Students and teachers were positive about their classroom colours, except for the Roseneath students and the Clyde Quay teacher who were neutral about the colours.

The Clyde Quay classroom's colours were mostly beige and black on the walls, light brown blue on the floor furniture, and blue and yellow on the ceiling. Students would like more bright and exciting colours, and considered the existing colours dull and washed out. The teacher considered the colours very boring and would like more colours and less beige on the walls (Figure 8-63).

Thorndon classroom colours included red, beige, blue, white, and green. Students considered these colours bright and said that they looked good together. Some students would like more blue and green in the classroom. The teacher liked the red on one of the walls (Figure 8-64).

Northland classroom colours were blue, bluish gray, gray, and red. Students said that the colours were good and cool, although other students considered some, such as blue, as pale. The teacher stated that the colours were restful and good to add displays to (Figure 8-65).

Roseneath classroom colours contained white, blue, light brown, green, and red. Students stated that the classroom did not have many colours and that the existing colours were plain. The teacher considered the green colour inside the classroom as peaceful and that it toned with sea views. However, she did not like the white on top of the walls (Figure 8-66).

FIGURE 8-63. THE COLOURS IN THE CLYDE QUAY CLASSROOM.

FIGURE 8-64. THE COLOURS IN THE THORNDON CLASSROOM.

FIGURE 8-65. THE COLOURS IN THE NORTHLAND CLASSROOM.

FIGURE 8-66. THE COLOURS IN THE ROSENEATH CLASSROOM.

DISCUSSION AND RECOMMENDATIONS.

In the four classrooms, the students liked bright colours and a colourful classroom, whilst the teachers liked the existing colours (Figure 8-67). Although most students were positive about the classrooms' colours, they would like palates of colours with more variety. Nair and Fielding (2007) state that children are stimulated by colours of nature and human skin tones. Actually all colours have a role in learning environments when used properly. It is important to create a rich colour environment in classrooms, where neutral colours, such as white, gray, and beige, are not dominant in the room (Nair and Fieliding, 2007).

In the four classrooms, the colour palettes were dominated by shades of the same colours, neutral colours, or just two or three colours. Classrooms should contain a variety of good colours. These colours should be studied, as well as furniture dimensions or even the classroom curriculum. According to Day and Midjber (2007), colours in the rooms where children stay for hours need to be stimulating and balance the mood. The room should contain

darker and lighter, warmer and cooler, as well as active and dreamy colours (Midjber, 2007).
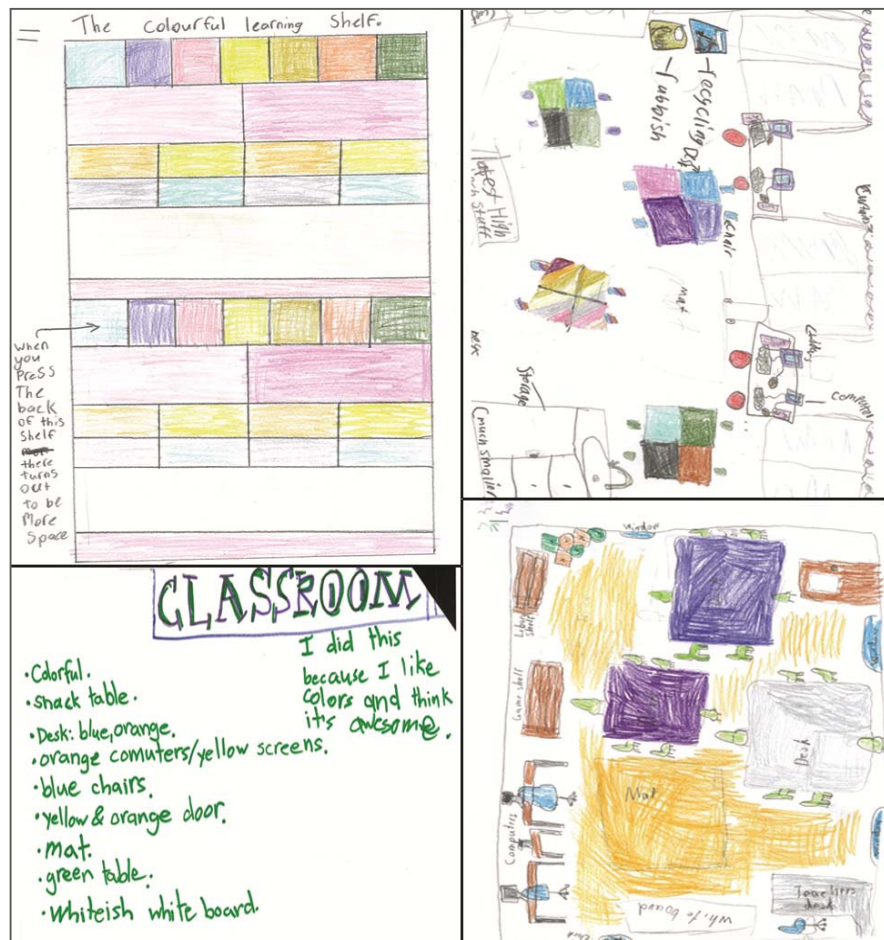
FIGURE 8-67. STUDENTS' DRAWINGS SHOWING HOW IMPORTANT COLOURS ARE TO THE CHILDREN. DRAWINGS ARE FROM THE NORTHLAND, ROSENEATH, AND THORNDON CLASSROOMS.

8.3.2 MATERIALS AND TEXTURES OF THE CLASSROOM

In student interviews, students had lists of materials and textures and they were requested to choose the materials and textures they recognized in their classrooms and give examples.

Students in all classrooms could recognize a range of four to five textures and a range of four to five materials. Most students gave good examples for textures and materials. Teachers confirmed that their classrooms contained a variety of materials and textures, but the Roseneath classroom teacher said that the classroom needed more variety. She stated that there was nothing to enjoy feeling or touching. Most of classroom materials were the same in all classrooms. The main materials were plastic, metal, MDF, carpet, and fabric.

DISCUSSION AND RECOMMENDATIONS.

Three of four teachers considered their classrooms as containing a variety of textures and materials, whereas the classrooms, as the researcher noticed, only had a few materials with no variety in textures. Unfortunately, teachers were not aware of the importance of textures and materials in the classroom. According to the MI settings from the proposition in Chapter 6, different materials and textures are important for bodily-kinaesthetic intelligence. Only one teacher claimed that her classroom needed different textures to touch and feel.

Variety of textures can be easily applied in classrooms by applying different materials on varying settings. Using the natural texture and appearance of some materials would be very good for learning and discovering different materials. Manufactured materials, such as plastic and MDF, feel dull to touch and are less interesting to work with, unlike living materials, such as clay and wood (Day & Midjber, 2007). Walls could be covered with differently textured tiles that are not only interesting to touch, but also reflect light differently.

8.3.3 CLASSROOM LIGHTING

In terms of artificial lighting, each classroom had six fluorescent lighting fixtures on the ceiling, except for the Thorndon classroom, which had eight. In addition to the artificial lighting, there were two windows in the Clyde

Quay classroom; five windows and two glass doors in the Thorndon classroom; two small windows, high windows, and glass sliding door for natural lighting in the Northland classroom; and eight small windows and a glass wall in the Roseneath classroom (Figures 8-68 to 8-71). All students and teachers were positive about the lighting in their classrooms, except for the Clyde Quay teacher, who confirmed that the lighting in the classroom was not adequate. He stated that the classroom's location was in a corner of the school building and that the day light was blocked by a neighbouring building.

FIGURE 8-68. THE WINDOW THAT FACES THE NEIGHBOUR'S BUILDING IN THE CLYDE QUAY CLASSROOM.

FIGURE 8-69. A WINDOW IN THE LIBRARY CORNER IN THE THORNDON CLASSROOM.

FIGURE 8-8-70. THE WINDOWS AND SLIDING GLASS DOOR IN THE NORTHLAND CLASSROOM.

FIGURE 8-71. THE GLAZED WALL AND WINDOWS IN THE ROSENEATH CLASSROOM.

There were curtains for the windows in the Clyde Quay classroom. One of the windows opened to a shaded veranda and the neighbouring building located about 2 m away from the window blocked the other one. On the observation day, the artificial lighting fixtures were turned on most of the class time.

183

In the Thorndon classroom, the teacher stated that some new blinds had been installed for sun glare. On the observation day, artificial lighting fixtures were used when working at desks, reading, and writing. During mat time, in the morning, and lunchtime, the class depended on day light only.

In the Northland classroom, some students complained about sun glare. On the observation day, the class depended on artificial lighting all the time. In the Roseneath classroom, blinds were installed on all windows. Students said that sometimes there was sun glare. However, the teacher stated that the glass surfaces were equipped with filters and blackout blinds to control sunlight. On the observation day, the artificial lighting was turned on most of the time. During the class time, one of the students became annoyed with the sun glare. He wanted to drop the blinds but could not reach them. So he went back to his desk and put a book vertically on the desk in front of him to protect his eyes from the sun glare.

DISCUSSION AND RECOMMENDATIONS.

Wellington City has an unsettled climate; it is very often cloudy and rainy. Natural lighting is important in classrooms, but in a city like Wellington, artificial lighting is almost unavoidable and requires further attention. According to Bergsagel et al. (2007), light affects people's energy, motivation, and vision. In schools, all important activities, such as reading, writing, and working at computers, require proper lighting levels. As it is difficult to control levels of natural light (on cloudy days), artificial and natural light should be in a good balance, although it is important to design effective ways for natural light to be managed by teachers and children.

The main factors that affect levels of natural light are climate, location, and the sun's pathway through the sky. These factors are hard to change in existing classrooms, but should be considered in new ones. For artificial light, schools needs a balance of two types of fixtures: those which send

light upward to the ceiling where it is reflected towards other surfaces, and those that send light downward directly to working surfaces. There are also mood lights that give special identity to the space (Bergsagel et al., 2007).

In the four classrooms, fluorescent light fixtures on the ceilings were exclusively used. Some classrooms had special lighting fixtures for whiteboards. However, there was no variety in the lighting levels inside the classrooms. These classrooms may need a group of different lighting levels and mood lights to create a special identity for each space. To utilise natural light, all classrooms had a number of windows that let light into the classroom, and both teachers and students were aware of the importance of natural light (Figure 8-72). However, in the Clyde Quay classroom, the teacher complained that the location of the classroom did not help in getting enough natural light. In the Roseneath classroom, the location was good and the classroom got direct sunshine, but although there were blinds and filters on windows, glare from direct sunlight still annoyed students inside the classroom, as some could not reach and control the blinds. Windows blinds and drapes should be reachable end easy to control for children.
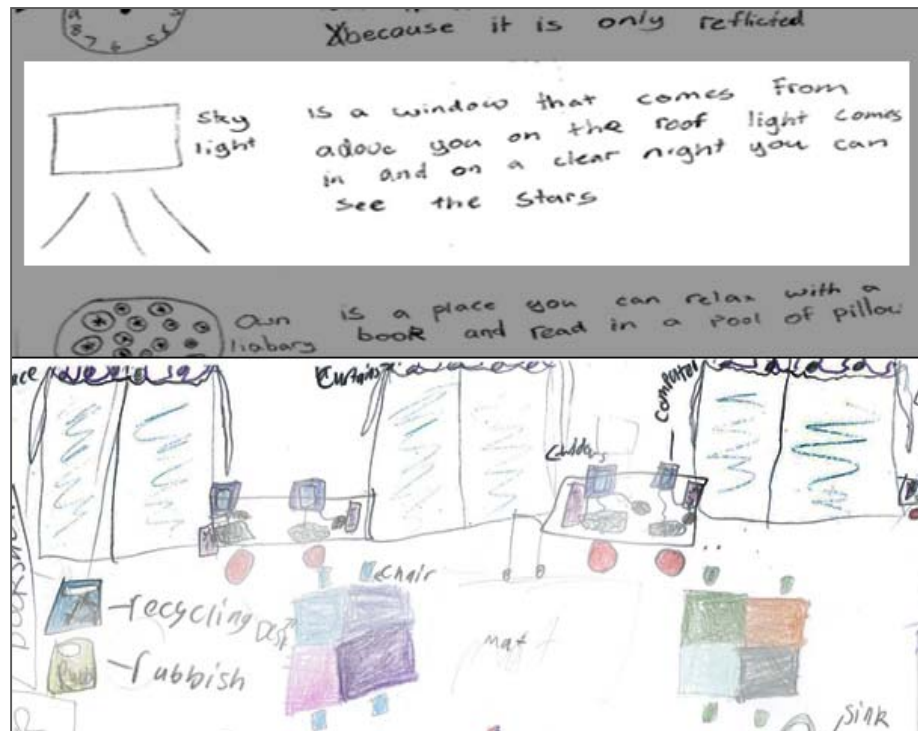
FIGURE 8-72. STUDENTS' DRAWINGS FROM NORTHLAND AND ROSENEATH CLASSROOMS DEMONSTRATED THAT STUDENTS WERE AWARE OF THE IMPORTANCE OF WINDOWS AND CURTAINS INSIDE THE CLASSROOM.

8.3.4 CLASSROOM HEATING

Students of the four classrooms were positive about heating in their classrooms. Clyde Quay and Thorndon teachers considered heating as "okay" in their classrooms, whilst the other two teachers considered it good.

The Clyde Quay classroom heating was provided by a small electric heater (Figure 8-73). Students confirmed that it got very cold in mornings and that the heater was not powerful enough to warm the classroom. On the observation day (03/06/2010), the heater was turned off and it felt cold inside the classroom.

In the Thorndon classroom, there was a small electric heating unit in the mat area (Figure 8-74). Students stated that there were not enough heaters. The teacher said that it was difficult to keep the warmth inside the room

that was not insulated properly. On the observation day (09/06/2010), the heater was turned on. It was warm near the heater, but felt cold in other areas of the classroom.

In the Northland classroom, there was a gas-heating unit (Figure 8-75). One of the students, who sat next to the heater, claimed that it sometimes got really hot. On the observation day (14/06/2010), the heater was turned on and the classroom was warm. However, it got colder when students opened the glass sliding door directly to outdoors.

In the Roseneath classroom, there was a heat pump on one of the walls (Figure 8-76). On the observation day (21/06/2010), the heat pump was turned on and it was warm inside the classroom unless the door was open.

FIGURE 8-73. THE ELECTRIC HEATING UNIT IN THE CLYDE QUAY CLASSROOM.

FIGURE 8-74. THE SMALL ELECTRIC HEATING UNIT IN THE THORNDON CLASSROOM.

FIGURE 8-75. THE GAS-HEATING UNIT IN THE NORTHLAND CLASSROOM.

FIGURE 8-76. THE HEAT PUMP IN THE ROSENEATH CLASSROOM.

DISCUSSION AND RECOMMENDATIONS.

The main issue in classroom heating was the poor room design which allowed external doors to open directly into heated spaces. The researcher noticed that even in well-heated classrooms, it got cold once the doors were open. In some classrooms, the doors opened to interior corridors. If those corridors were well heated and not open to the outdoors, then the warmth lost from classroom would be minimised when the doors were open. In other classrooms, doors opened to outdoor verandas. Those verandas could be closed by glass walls, perhaps heated, and be a transition area between the warm classrooms and cold outdoors. The verandas could also be used for some activities, such as project activities and effectively add more teaching space to the classroom. However, solar overheating could be a big problem in some glazed in verandas.

8.3.5 ACOUSTICS INSIDE THE CLASSROOM

The acoustics in the four classrooms were modified by the fabric on furniture, soft treated wall coverings, carpet on floors, and window blinds and drapes. Students of the classrooms confirmed that they were usually able to hear the teacher and each other clearly inside the classroom, unless students were chatting or the teacher was far away. The Clyde Quay and Northland teachers supported their students' statements, whilst the other two teachers said that students always heard each other in the classroom. All students and teachers confirmed that there was no quiet space inside the classroom, except for the Thorndon teacher and students who stated that the library area was slightly less noisy than other areas in the classroom because it was partially separated from other areas.

In the Clyde Quay classroom, on the observation day, there was noise from other classrooms in addition to noise inside the classroom (chatting students). In the Thorndon classroom, on the observation day, the class got very noisy

during the art class because students were chatting. Northland classroom students stated that they could go to the withdrawal room for quiet time. On the observation day, there was noise from other classrooms. The sliding door between this classroom and the other classroom was the main contributor to this noise. In the Roseneath classroom, on the observation day, students, who joined from another classroom to work on computers, made noise during the class time; they were chatting and discussing their work on computers.

DISCUSSION AND RECOMMENDATIONS.

According to Bergsagel et al. (2007), a well designed acoustic classroom should be insulated from outside noise and acoustically separated from gym or music rooms. The reverberation time of sound should be reduced to the national standard in each classroom. To achieve this, designers should take care of sound isolation in designing and detailing doors, windows, walls, and roofs. The materials of finishes should be absorptive surfaces. Movable partition walls could be applied in large classrooms to divide the area to smaller space for groups with minimum noises (Bergsagel et al., 2007). According to Whitlock and Dodd (2004), as the most traditional teaching styles in classrooms have been replaced by group work activities, the noise level has increased dramatically, and there is a need for the improvement in classroom acoustics (Whitlock & Dodd, 2004).

In the four classrooms, only the Thorndon classroom had a semi-quiet corner (library corner). For entire classroom acoustics, the classrooms had some sound absorptive materials and finishes. However, reverberation time of sound was not considered during the case studies, as this research focused on the general classroom interior design.

8.4 OVERALL ASSESSMENT

After surveying the major components in the classrooms, some general comments and discussions became could be made. They include general issues and discussions about the classroom circulation.

8.4.1 GENERAL ISSUES

General questions were asked to teachers and students about their classrooms. These questions mainly enquired about what they liked and disliked about the classrooms, what the classroom may need, and what they would like to change.

In the Clyde Quay classroom, the teacher and the students liked the classroom, although one student complained about the classroom being noisy and crowded. Students liked their tables because they could read and do anything they wanted on them. One student disliked student boxes because they were untidy, which made the classroom look untidy too. Both students and the teacher would like a bigger classroom with a different furniture arrangement. The teacher liked the fact that the classroom was located in the school corner, far away from the noise and distractions. He also liked sitting on the mat with his students because the mat area had more light than other areas in the classroom. The teacher would like more windows, storage area, and bigger art area.

In the Thorndon classroom, the teacher and the students liked the classroom. They liked the library area the most because it was soft and quiet, and they would like it to be bigger. Everyone also liked the mat area because they could sit and work together. The teacher liked the location of the classroom near the library, playground, and courtyard. However, she would like many improvements to be done in her classroom. She would like more drama space, a couch, soundproof area (e.g., *"A glass box"*), a different furniture arrangement, an integration for the classroom garden into the classroom (e.g., *"French doors"*), and would like the classroom to be *"eco-friendly."*

In the Northland classroom, although some students said that it sometimes got boring, the students and the teacher liked the classroom. Students liked their tables, because they gave them privacy, as well as the computer area. Both teacher and students would like bigger classroom and bigger tables. The teacher liked the outdoor-indoor access in the classroom that leads to the playground.

In the Roseneath classroom, most students were neutral about the classroom because it sometimes got noisy. Students liked the mat, as it was soft, and the desks, as they could read and work on them. However, students would like to change the furniture arrangement. The teacher liked the classroom, but she would like a different furniture layout, soft furniture, a quite space, and doors that open to the outside. She liked the mat the most, as she could sit and work with small groups.

DISCUSSION.

In the four classrooms, students and teachers had some common issues. The first one relates to the problems with furniture layouts. Mainly the classroom teacher, who may not be aware of different possibilities in furniture layout, arranges the classroom furniture. As a result, the classrooms have problems, such as the need for extra space, some crowded areas, and also areas that cannot be used for any activity.

The second common issue is that teachers and students like working on the mat, mainly because they sit and work together on a comfortable setting. Thus, the mat area is a primary component in primary school classrooms and has to be designed to suit the users' needs. For example, a mat area with cushions and furry rugs would make the area much better and comfortable for long activities.

The third issue is the inside-outside access. Teachers like to have to the playground and outdoors related to their classrooms. The Thorndon teacher

would like to integrate the classroom garden into the classroom. The Roseneath teacher would like to have access to the outdoors. Therefore, in classroom designs, direct indoor-outdoor access should be incorporated. Moreover, the location of the classroom next to the playground or any outdoor field could help in making this access possible.

The fourth issue related to the storage in classrooms. Teachers and students recommend having more storage units. The final issue is the need to a quiet and private space in the classroom. Both are discussed in previous sections in this chapter.

8.4.2 CLASSROOMS CIRCULATION

The second assessment is on the classroom circulation. It depends mainly on the circulation diagrams, which are a result of the movement observation in the observation sheets.

The major movements in the four classrooms are those between the classroom door and the mat area, between the mat area and student's desks and tables, and between the desks and the classroom door. There are some minor movements, such as movements to other secondary settings or movements around the classroom. While the movements between the mat area and the door in the Clyde Quay and Thorndon classrooms were through students' desks, in the Northland classroom, it was direct, and in the Roseneath classroom, almost direct (Figures 8-77 to 8-80). On the observation days, in the Clyde Quay classroom, students spent 13% of the class time on moving in and out the classroom. Students spent 11% in the Thorndon classroom, and only 5% in the other two classrooms (Figure 8-81). It may be easier and faster for students to move through the mat than through desks to the mat, giving that the mat is a furniture-free area.

Another issue is that the circulation in some areas in classrooms is difficult and needs more space. In these classrooms, there was not enough space

around the computer area for smooth circulation. In the Roseneath classroom, the circulation paths were narrow even between desks. Classrooms should be designed with a good circulation so the users can work and move around easily, thus using their time more efficiently.

The Movement between tables and mat area
The Movement between mat area and outdoors
The Movement between tables and outdoors

FIGURE 8-77. CIRCULATION IN THE CLYDE QUAY CLASSROOM.

The Movement between tables and mat area
The Movement between mat area and outdoors
The Movement between tables and outdoors
The Movement between indoors and outdoors throw secondary doors
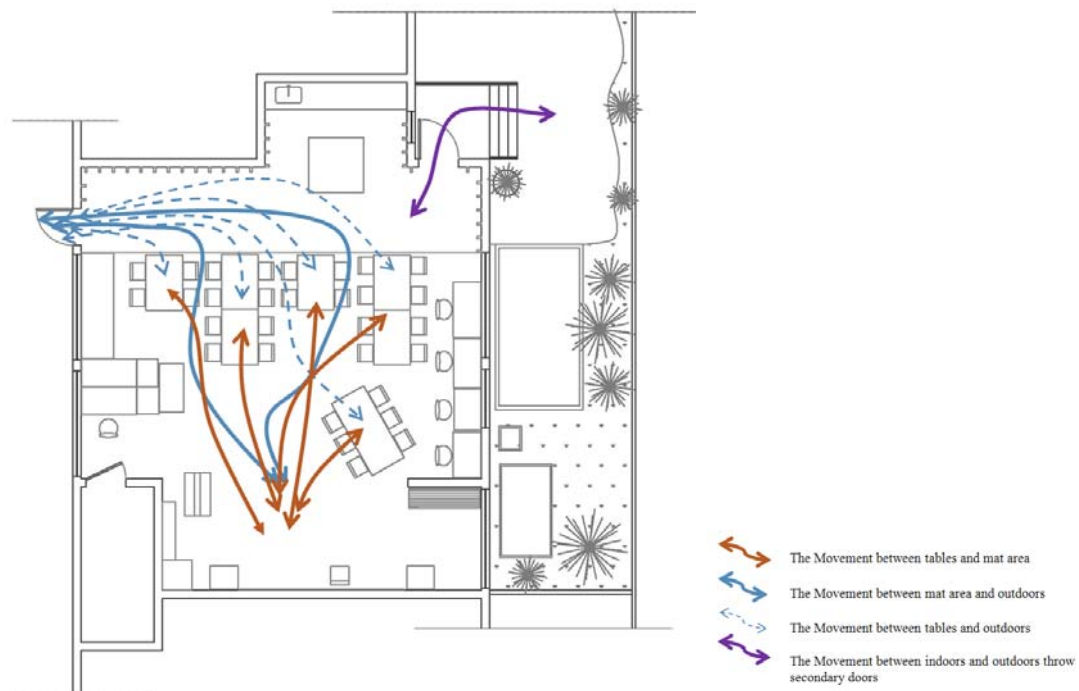
FIGURE 8-78. CIRCULATION IN THE THORNDON CLASSROOM.

→← The Movement between tables and mat area

→← The Movement between mat area and outdoors

←- -→ The Movement between tables and outdoors

→← The Movement between indoors and outdoors throw
secondary doors

FIGURE 8-79. CIRCULATION IN THE NORTHLAND CLASSROOM.

→← The Movement between tables and mat area

→← The Movement between mat area and outdoors

←- -→ The Movement between tables and outdoors

FIGURE 8-80. CIRCULATION IN THE ROSENEATH CLASSROOM.
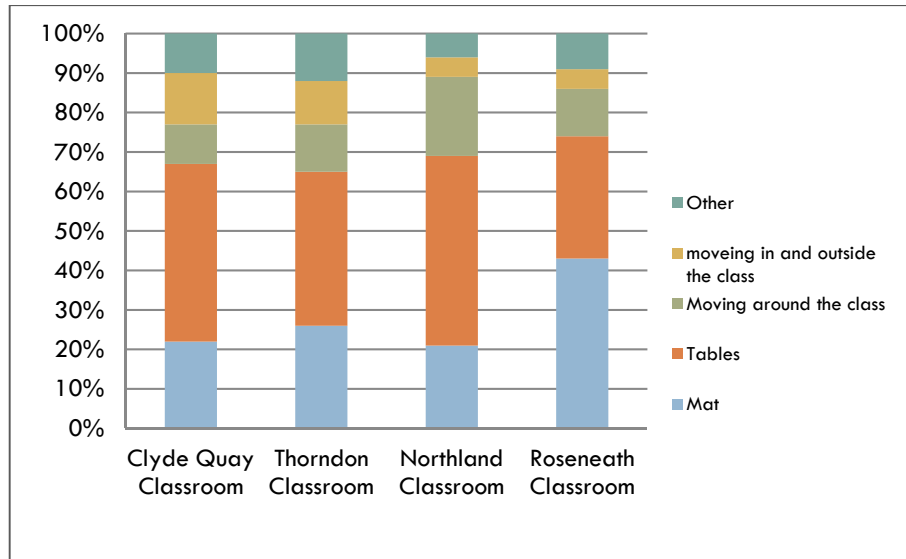
FIGURE 8-81. THE TIME SPENT ON DIFFERENT ACTIVITIES IN THE FOUR CLASSROOMS ON THE OBSERVATION DAYS.

8.5 MULTIPLE INTELLIGENCES INSIDE THE CLASSROOMS

8.5.1 THE MI THEORY AND TEACHERS

Settings and furniture in the four classrooms were almost the same, whether they were used for MI teaching strategies or not. This section presents the discussion about the MI theory and the four teachers. The teacher questionnaire contained a group of questions about the MI theory in the classroom, such as if teachers are using the MI theory and why, how often they use it, and what settings may help them in implementing MI strategies.

Only two of the four teachers used the MI theory in their teaching methods: Thorndon and Roseneath. They both sometimes used MI concepts in their classrooms, although the Thorndon teacher intended to use it more in the future. She acknowledged the differences between students, and believed that different teaching styles affect students differently. She would like a classroom with a variety of learning areas set up in different ways and seam to be able to use various settings. The Roseneath teacher was also aware of the differences between individuals and expected optimistic learning outcomes from applying the MI theory in the classroom. She

suggested having some special settings for the different intelligences, such as a fish tank for naturalist intelligence; different textures and smooth wooden balls to feel in the hands for bodily-kinaesthetic intelligence; headphones at desks for musical intelligence; areas for groups and carrels for individuals; a library corner; natural materials; and differences in the sunlight consistency in the classroom.

The two teachers that applied the MI theory in the normal primary school classroom would like to have additional special settings to help incorporate the MI theory in their teaching. However, even the other two teachers, who did not use the MI theory in their classrooms, would like to improve their classroom settings and have different learning areas and settings. This means that the variety in settings would not only help in MI teaching, but could also help with other teaching styles.

8.5.2 THE MI AND CLASSROOM SETTINGS

In the previous sections, each setting in the classrooms was analysed in relation to the MI settings from the study proposition. Here, the researcher presents all the settings together with the eight intelligences. In Table 8-9, the researcher indicates how well the existing settings in the four classrooms support the eight intelligences. Some intelligences are supported strongly, such as linguistic intelligence, while others are hardly supported, such as musical intelligence. From the results of Table 8-9, the researcher drew a graph that indicates the percentages of supporting the different intelligences in the classrooms. The pie chart in Figure 8-82 indicates that the four classrooms supported the linguistic and logical-mathematical intelligences the most. Although the other intelligences are moderately supported, musical, naturalist, and intrapersonal intelligences are the least-supported in the four classrooms.

These percentages reflect the aims of the national standard for primary learning. According to The New Zealand Curriculum Online (2011), the

197

national standard is working only on improving students' reading, writing, and mathematics knowledge and skills for the first eight years of school: the primary years (The New Zealand Curriculum Online, 2011).

TABLE 8-9: THE EIGHT INTELLIGENCES IN RELATION TO THE FOUR CLASSROOMS' EXISTING SETTINGS.[13]

Settings for:	Linguistic	Logical-Mathematical	Spatial	Musical	Bodily-Kinaesthetic	Interpersonal	Intrapersonal	Naturalist
Reading and writing	Strong	Strong				Strong		
Computer	Medium	Medium	Medium					
Art, projects and building activities			Strong		Weak			
Music and drama				Weak	Weak			
Physical activities					Weak			
Natural								Weak
Storage units	Medium	Medium	Weak					
Group work	Strong	Strong				Medium		
Individual work	Strong	Strong					Weak	
Whole classroom teaching	Strong	Strong				Strong		

✔ Strong support ✔ Medium support ✔ Weak support

---

[13] The information in the table is established according to the researcher observation and judgment.
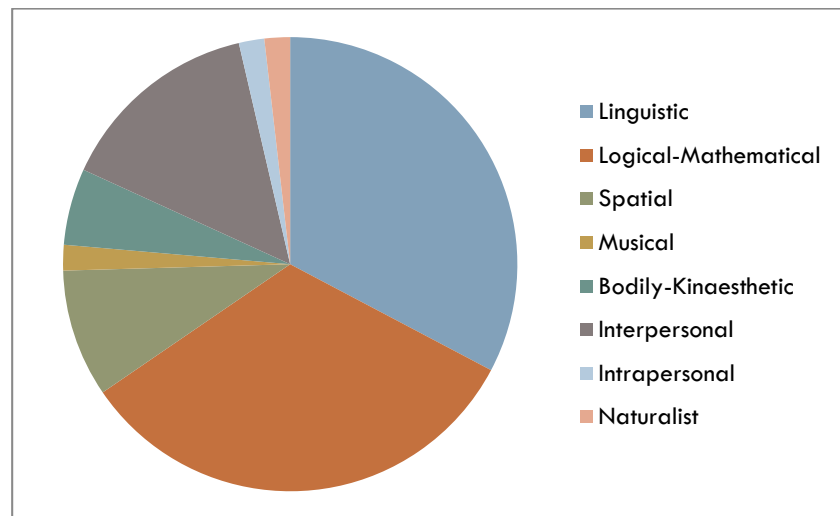
FIGURE 8-82. THE PERCENTAGES OF THE USE OF THE EIGHT INTELLIGENCES INSIDE THE FOUR CLASSROOMS BASED ON THE OBSERVATION AND ANALYSIS.[14]

8.6 REVIEWING THE RESEARCH PROPOSITION

After completing the analysis of the four case studies, the preliminary proposition should be reviewed according to the explanation – the building technique used in this research. In Chapter 6, several settings that may support MI teaching strategies were proposed. In this section, those settings are discussed, depending on the outcome of the four case studies. The same MI settings from the proposition are analyzed depending on the existing settings, settings suggested by the students, and those proposed by their teachers. This analysis identifies the key educational settings and their level of importance (Table 8-10). What is also apparent is that neither students nor teachers were aware of MI-specific settings. Thus, in order to remove any potential bias, the survey focused on the existing classroom settings.

---

[14] The information in this graph is collected from Table 8-9 with the weak support = 1, medium support = 2, and strong support = 3.

In table 8-10, columns represent three observed/surveyed categories: the number of classrooms in which certain settings exist, how many teachers suggested or supported these settings, and in how many classrooms these settings were supported by students. In the "suggested by students" column, wherever any quarter of the circle is black it means that at least one student from one classroom suggested this setting.

According to the analysis (Table 8-10), some settings, were not part of the current classroom setting, but no user deemed their inclusion necessary or important, as was the case of, for example, the counter for science experiments. Storage settings are the only settings that are already provided in all four classrooms and all users agree on their necessity in their classrooms. Other settings are either already present in the classrooms or are suggested by at least one user. The graph given in Figure 8-83 shows how strongly the proposed settings are supported by the four case studies. The least supported MI settings are: different materials and textures, corner for sports and physical activities, head phones, building corner, and music corner. In contrast, the most supported settings, with different support rates, are: storage settings, then empty space for free physical activities, followed by an art area, computer settings, and tables for formal seating.

TABLE 8-10: THE PROPOSED MI SETTINGS IN RELATION TO CLASSROOMS AND STUDENTS AND STUDENT SUGGESTIONS

⊕ IN NO CLASSROOM	◔ IN ONE CLASSROOM	◑ IN TWO CLASSROOMS	◕ IN THREE CLASSROOMS	● IN ALL THE CLASSROOMS

MI possible Settings:	Intelligences may be served	Existed in classrooms	Suggested by teachers	Suggested by students	Comments
Tables and chairs for formal seating	Linguistic	● (all)	⊕ (no)	● (all)	
Soft floor seating or couches supported by some cushions	Linguistic Musical Interpersonal	◔ (one)	◑ (two)	● (all)	
Computer tables supported by printers and some software	Linguistic Logical-Mathematical Spatial Intrapersonal Naturalist	● (all)	⊕ (no)	● (all)	There are no printers except in Clyde Quay and Roseneath classrooms
Mini stage or special corner for telling stories, giving speeches, playing music, or performing	Linguistic Musical Bodily-Kinaesthetic Interpersonal	⊕ (no)	◔ (one)	◔ (one)	
Storage units for books and tools	Linguistic Spatial Musical	● (all)	● (all)	● (all)	
Video and/ or Audio System	Linguistic Musical Interpersonal	● (all)	⊕ (no)	⊕ (no)	Classrooms have only stereos
Nooks, wall niches or window benches for private thinking and working	Logical-Mathematical Musical Intrapersonal	⊕ (no)	◑ (two)	◑ (two)	

MI possible Settings:	Intelligences may be served	Existed in classrooms	Suggested by teachers	Suggested by students	Comments
A table or any special place for group work and discussions	Logical Mathematical Spatial Musical Bodily Kinaesthetic Naturalist Interpersonal	(empty)	(half filled)	(full filled)	There are no dedicated settings in classrooms for group work, but student's desks and tables are gathered in groups for working individually and in groups
A counter and some high chairs for experiments and discoveries supported with a water tap	Logical-Mathematical Naturalist Interpersonal	(empty)	(empty)	(empty)	There are water taps in three classrooms
A place to display students' work and achievements	Logical-Mathematical	(full filled)	(half filled)	(empty)	
An art area with art tables (there could be one or two painting stands)	Spatial	(three-quarters filled)	(half filled)	(three-quarters filled)	
A building corner (movable, flexible or buildable furniture, and/or building materials with wide range of colours and shapes)	Spatial	(quarter filled)	(empty)	(empty)	
Headphones for individual music listening	Musical Intrapersonal	(empty)	(quarter filled)	(empty)	

MI possible Settings:	Intelligences may be served	Existed in classrooms	Suggested by teachers	Suggested by students	Comments
A corner for sports with cabinets for storing sports equipment	Bodily-Kinaesthetic	(in no classrooms)	(in no classrooms)	(in one classroom)	
Different textures and materials applied to furniture and walls inside the classroom	Bodily-Kinaesthetic	(in no classrooms)	(in one classroom)	(in no classrooms)	
Living creatures	Naturalist	(in two classrooms)	(in one classroom)	(in two classrooms)	
Direct access to outdoor natural settings	Naturalist	(in two classrooms)	(in two classrooms)	(in two classrooms)	
A large empty space inside the classroom with comfortable flooring (carpet for example) for free physical activities and creative movements	Bodily-Kinaesthetic	(in all the classrooms)	(in one classroom)	(in all the classrooms)	All classrooms have a mat area, but is not used not for physical activities
Music corner supported by music instruments		(in no classrooms)	(in no classrooms)	(in one classroom)	

Legend:
- ◌ IN NO CLASSROOMS
- ◔ IN ONE CLASSROOM
- ◑ IN TWO CLASSROOMS
- ◕ IN THREE CLASSROOMS
- ● IN ALL THE CLASSROOMS

MI Proposed Settings

Setting	Support
Music corner	(very low)
An empty space for free physical activities	(high)
Access to outdoor natural settings	(medium)
Living creatures	(medium)
Different textures and materials	(low)
A corner for sports	(low)
Headphones	(low)
A building corner	(low)
An art area	(high)
A place fordisplay	(medium)
A counter for experiments and discoveries	(none)
A special place for group work	(medium)
Place for private thinking and working	(medium-low)
Video and/ or Audio System	(medium-low)
Storage units	(very high)
Mini stage	(low)
Computer tables	(high)
Soft floor seating or couches	(medium-high)
Tables and chairs for formal seating	(high)

How much each setting is supported

FIGURE 8-83: SUPPORT FOR THE MI PROPOSED SETTINGS IN THE FOUR CASE-STUDIES.15

---

15 The graph is based on the information from Table 8-10, which represents the existence of the proposed MI setting in the classrooms and/or the users' recommendations and suggestions. Because of the difficulty of defining the accurate number of students' recommendations – as they are gathered from interviews, group discussion, and students' drawings – the information in the graph r is based on at least one student from each classroom making the suggestion.

Conclusion:

Two key conclusions can be reached based on the information presented in this chapter. Firstly, most users have a very positive view of their classroom settings. The second conclusion is linked to the MI theory and the MI settings in the four classrooms. In support of the first conclusion, Figure 8-84 and 8-85 show that all students and teachers, with the exception of the Clyde Quay teacher, responded positively about most of the settings in their classrooms. These positive responses may indicate that classroom users are satisfied with their classrooms or/and they are not aware of how much improvement in the classrooms could be made with different settings. The results of this research may help in highlighting the importance of changes that classrooms may need for better learning environments to teachers, school principals, and people who are responsible for school buildings and their design.

The second conclusion is that the MI theory is not supported strongly in the four classrooms. Classrooms mainly support linguistic and logical-mathematical intelligences, whilst other intelligences are treated as secondary, complementary activities. Most of the proposed MI settings are well supported by the case studies, whether classrooms use the MI theory as a teaching strategy or not. Thus, the educators could apply at least the most supported MI settings in their existing classrooms to create an environment for students and teachers that would foster leaning and encourage exploration of new concepts and knowledge acquisition processes. The next chapter, the conclusion chapter, discussion the possibility of applying the MI settings in classrooms for different teaching styles.
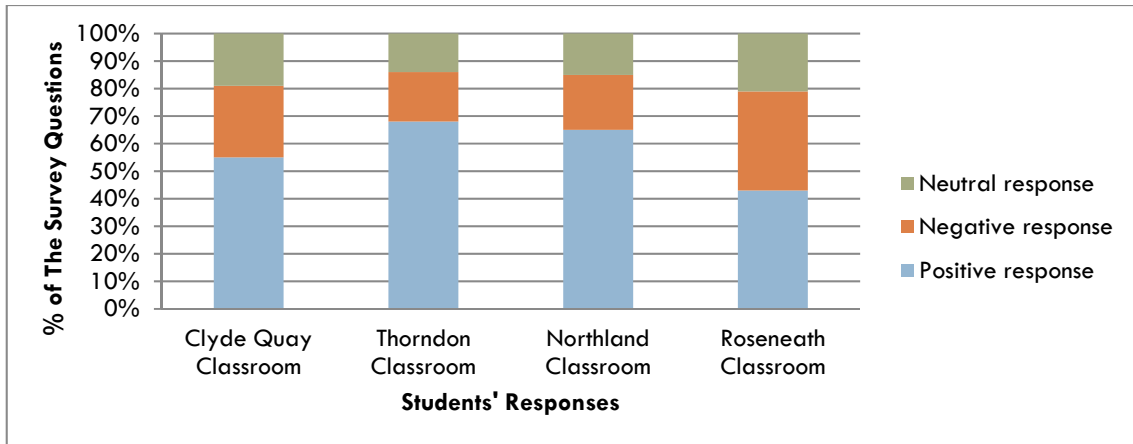
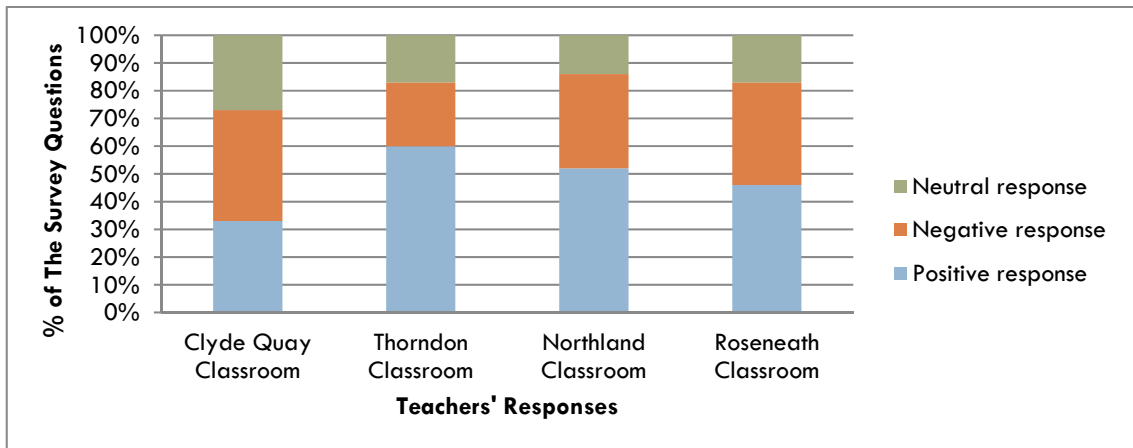FIGURE 8-84: STUDENTS' RESPONSES TO THE SURVEY QUESTION IN THE FOUR CLASSROOMS.

FIGURE 8-85: TEACHERS' RESPONSES TO THE SURVEY QUESTIONS IN THE FOUR CLASSROOMS.

CHAPTER 9: DISCUSSIONS AND CONCLUSIONS

Introduction

The analysis of the research case studies was given in the previous chapter, from which some important conclusions can be drawn and discussed further in the subsequent sections. The key findings stemming from the analysis are that although most MI settings are suggested and recommended by the study participants, only two intelligences are presently strongly supported in their classrooms – linguistic and logical mathematical intelligences. These main findings are further discussed in conjunction with other results from the entire thesis in order to propose a new, better approach to primary school classroom interior design and settings.

This chapter is divided to two sections. The first section contains four subsections. The first discusses the existing settings of New Zealand primary classrooms and identifies the main reason for the clear need for new classroom settings and designs. The second subsection explains how MI settings could provide support in the learning process, which is followed by a subsection that examines the possibility of incorporating different MI settings in New Zealand primary school classrooms. The fourth sub section discusses areas not addressed in the current work due to limitations of the study. It also discusses generalizing the result of the present study to other primary school classrooms. The final section provides the general conclusions of the thesis by responding to the original aim of the study.

9.1 DISCUSSIONS
9.1.1 NEW ZEALAND PRIMARY SCHOOL CLASSROOM SETTINGS AND INTERIOR DESIGN

Although half of New Zealand primary school teachers and principals use different learning styles that are based on MI theory (Schagen & Hipkins, 2008), no studies focusing on classroom settings and interior design have

been conducted. Most extant research in this field focuses on school acoustics, lighting, and air quality (Sheerin, 2009). Schools may have changed in design, but the majority still conform to the old design style of single classrooms (Sheerin, 2009). As teachers and others directly involved in child education are not experts in the interior design field, it is unrealistic to expect them to introduce new concepts and innovative theories in classroom design and settings. Inventing a new classroom design, or even just new standards for classroom design, may need extensive research and study.

In the four case studies presented in this thesis, the students complete their activities and schoolwork mainly within two standard settings – student's desks and the mat. Even though there is other furniture in the classroom, it is rarely used. The teachers and students who participated in the study suggested and recommended many settings in addition to those commonly used, such as special storage units for art tools and children's paintings. Perhaps they expect improvement in the teaching and learning that would be facilitated by the suggested settings. Even the two teachers who do not incorporate the MI theory into their teaching practice confirm that their classrooms may need different settings.

In some cases, the classroom is used for more than the usual teaching and learning activities. Students do other activities – such as playing, dancing, and eating – which could be incorporated into the classroom curriculum. In addition to teacher motivations and teaching strategies, settings inside the classroom could encourage children to attempt and engage in a wide variety of activities.

9.1.2 MI SETTINGS FOR BETTER LEARNING ENVIRONMENTS

MI initiatives attempt to change the educational settings that only support general intelligence or the traditional view of intelligence. The supporters of the notion of general intelligence claim that everyone is born with a

certain level of intelligence. Hence inherited levels are difficult (or even impossible) to change; what is more, they can be measured by pencil and paper tests (Gardner, 2001). Settings such as students' desks support this point of view strongly, as general intelligence does not require any external supports, as it is deemed sufficient for students to receive information from lectures and instructions, and learning can be assessed by written tests. Other settings, such as art areas, may not be involved in the general curriculum, even if they exist in the classroom.

The MI theory proposes that there are different kinds of intelligence and each individual can have a wide range of abilities across those measures (Stanford, 2003). It also stipulates that intelligence cannot be measured by standardized tests that involve pattern matching and similar IQ intelligence testing. It requires several methods, depending on the type of intelligence being assessed (Baum et al., 2005). This research suggests that classroom settings may affect students' assessment as different types of settings may change the way that students express their knowledge. As the MI theory suggests several assessment methods, the same can apply to classroom settings, thus taking an innovative approach may encourage students and teachers to achieve more during the lessons. Installing settings specifically designed and tailor-made for each of the intelligences could give the students more opportunity to express their talents and intelligences in the classroom and in life in general. For example, special settings that include music instruments may motivate students who are musically intelligent to express their progress in learning through playing a piece of music or singing a song. If there are no musical settings in the classroom, the same students may not find the most appropriate medium to express themselves, and may give an impression to the teacher that they are not capable of understanding the information discussed in the class. This research proposes applying the MI theory in the classroom design through applying richer environments with variety of settings, colours, and textures that encourage different students' abilities.

The MI settings support and are aligned with the eight intelligences, but they also accomplish other design goals. Nair and Fielding (2007) suggest that schools and learning environments should support 18 modalities – including naturalist learning, technology-based learning, team collaborative work, and art-based learning – all of which are well served through MI settings. There is an intelligence aligned with naturalist learning, and there are several settings that support its development, such as an access to the outdoors and living creatures, in addition to other activities that could involve naturalist studies. Technology-based learning is represented in the MI theory by many intelligences – such as logical-mathematical and spatial intelligences. More recently, the addition of information technology and media learning into MI settings is proposed in order to keep abreast of the latest developments and innovations in society. Team collaborative work is represented by interpersonal intelligences and supported by almost all other intelligences and MI settings. Similarly, art and artistic expression is supported by spatial and bodily-kinetic intelligences, and there are MI settings that serve other types of learning, such as the art area.

9.1.3 NEW ZEALAND PRIMARY SCHOOL CLASSROOM SETTINGS AND MI SETTINGS

In the case studies conducted as a part of this project, the four classrooms' activities depend mainly on writing and reading on the mat and students' desks. As a result, linguistic and logical-mathematical intelligences are supported much more than other intelligence types. The four classrooms under study are almost identical; thus other settings, even if they do exist, are not used often. Although students and teachers recognize the importance of, for example, an art area or informal communication corner, classroom settings do not reflect their views. For example, the art area in the classrooms is either non-existent, or is insufficiently represented and underutilized (just a small bench with a water tap, without any art tools or equipment). Only one classroom has a proper art area, although the

teacher prefers using the art room the school provides for all students. Actually, MI settings encourage the initiatives whereby art, music or other activities can be completed in a broad range of settings, including those away from the classroom. Thus, schools can have music, art room, and a library, but there should be at least a small setting representing these activities inside the classroom for fostering and supporting all types of intelligences. As the MI theory postulates that using MI teaching strategies can help students to strengthen their weaknesses through using their favourite intelligences, a variety of settings should be available on a daily basis to help students to express their favourite intelligence inside the classroom. For example, even if the school provides a designated art room for art lessons, spatially intelligent students could still need the art area inside the classroom for expressing their knowledge through spatial intelligence activities, such as drawing the water cycle for a biology class, or memorizing the layers of the earth by creating a visual model of the earth layers.

Students and teachers support many MI settings and recommend having them in their classrooms if they are not already there. Furthermore, teachers are aware of the different teaching styles, whether they use the MI strategies or not. Thus, the user recommendations of some MI settings and their awareness of different teaching styles indicate the need for new designs and settings for the classrooms. As MI settings offer a wide range of classroom settings and furniture, this approach would be suitable for all classroom needs.

However, teachers and students already complain about small classrooms and lack of space, hence the question needs to be asked –how can additional settings be accommodated within confined space? This problem could be solved with creating space saving furniture for classrooms. Nagamitsu, Yaguchi, and Yoshida (1998) created space saving working equipment for Okamura Corporation, with the aim to create furniture for eight workers in a small area. The furniture includes support tables,

conference tables, and a table with sliding board for presenting digital data. Similarly, the inventors created movable, height-adjustable support tables and a partition that can surround a group of eight workers who can also use it to display images and data by projectors set on one of the support tables (Figure 1-9) (Nagamitsu, Yaguchi, & Yoshida, 1998). Classrooms are not that dissimilar to workplaces in terms of space-saving requirements, thus settings used within could be treated the same as working equipment. Classrooms could have foldable tables and chairs. Corners could accommodate an art area, which could be converted to areas for science projects and experiments, or music area by changing the furniture arrangement in short time. Students' chairs and desks could be foldable and easy to store to create more furniture-free space inside the classroom for free movement.

9.1.4 LIMITATIONS OF THE STUDY

The main limitations of the present study are the limited time available for rather extensive amount of work and the scope of the study. Due to these limitations, some areas are addressed in more detail than others. Notably, there are four areas that are out of the scope of the present research. The first one is the cultural implications of the MI theory in New Zealand. According to Gardner (1998), cultures could encourage individuals to be skilled in some areas more than others, which will promote development of some intelligences at the expense of other types (Gardner, 1998). It is important to find out which intelligences are strongest in New Zealand population. Knowing the strongest intelligences of New Zealand may affect the way that designers should deal with classroom settings. Chapter 5 discussed Maori culture in learning and teaching. The Maori Culture supports in some way many of the eight intelligences. Designers could focus on installing settings and design elements in classrooms that express New Zealand and Maori culture through the strongest intelligence and encourage students to shine in this intelligence. This point is not explored due to the study limitations in addition to the fact that none of the case
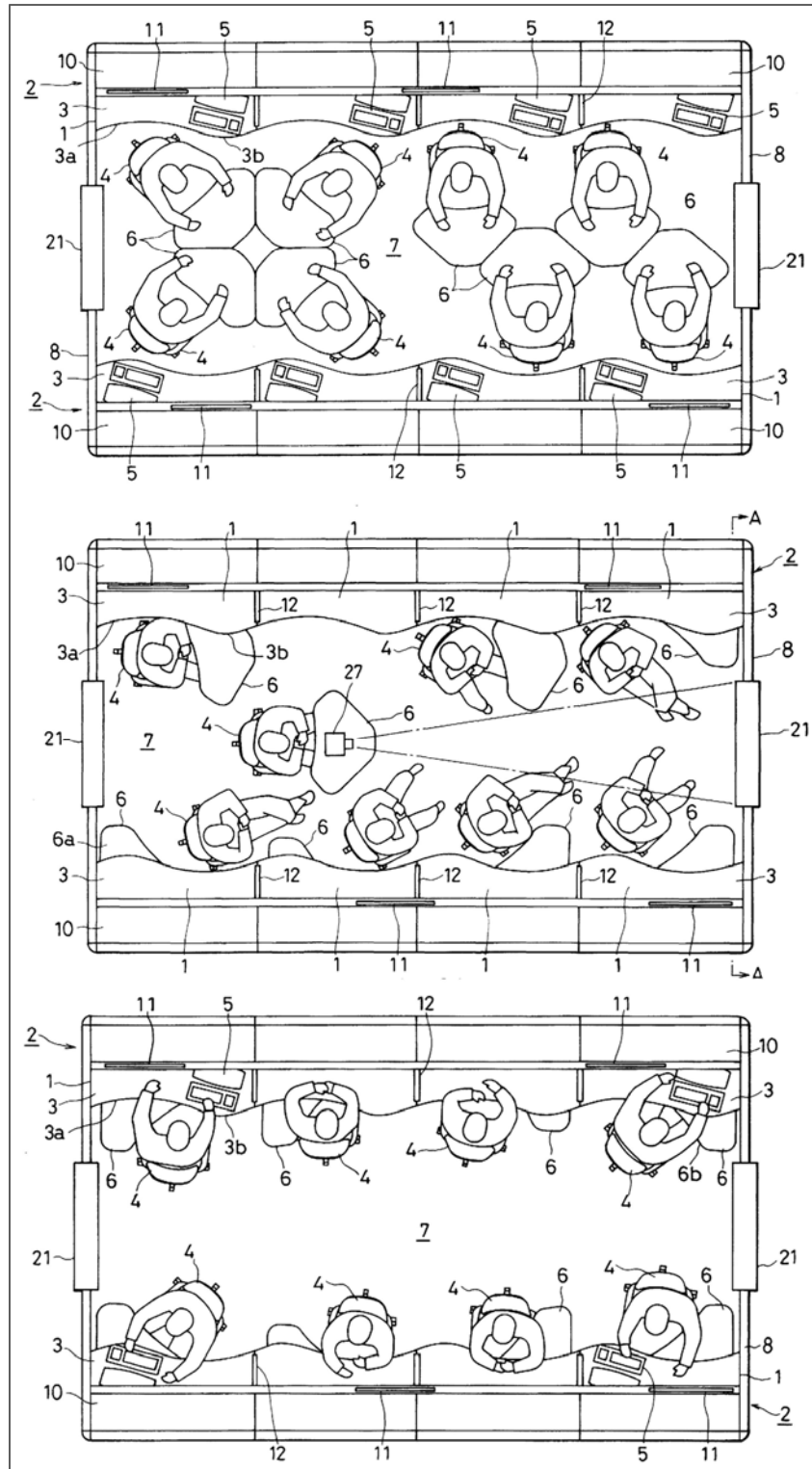
FIGURE 9-1: DIFFERENT USES FOR THE SAME SET OF FURNITURE IN OFFICE WORKING SPACE. (NAGAMITSU, YAGUCHI, & YOSHIDA, 1998)

studies showed Maori implications in the classrooms. Instead, the research

addresses all intelligences equally, as they need to be integrated in MI classrooms.

This study also focuses on classroom furniture and settings more than lighting, acoustics, and colours, although these factors are important in any successful design. According to Sheerin (2009), previous studies conducted in New Zealand focused mainly on acoustics, air quality, natural lighting and maintenance, whereas interior design, including furniture and settings, of classrooms was not explored (Sheerin, 2009). Therefore, this research – its limitations notwithstanding –gives attention to classroom settings more than other factors.

The third area unexplored in this thesis is integrating space saving furniture into the classroom, which would clearly be an ideal solution for creating more space in already crowded classrooms. Thus future studies could design and develop space saving furniture for primary school classrooms, based on the multiple intelligence settings recommended in this thesis. The results of these projects could improve the design of many classrooms.

Another issue affected by the study limitation is generalizing the findings. The research was conducted by employing a case study methodology, which clearly lacks a sufficient sample size for statistical analysis (Yin, 1994). Therefore the research findings cannot be generalized to all New Zealand classrooms, or internationally. Instead, the aim was to extend the application of the theory underpinning the study to other similar situations, New Zealand primary school classrooms in particular, as they could benefit the most from the findings of the study, as well as state schools in general. According to Geoffrey (1997), schools receive limited budgets for facilities from the New Zealand government every five years, and the government gives schools basic standard guidelines for designing learning environments. School principals and boards of trustees are responsible of the school design and building. As a result, the classrooms included in this study have very similar settings and designs.

However, the results of the study might not apply to other classrooms. Schools other than state schools might adopt different teaching philosophies and styles, such as Steiner or Montessori, which may prefer special settings and designs, although the general idea of installing a variety of settings and furniture may benefit these classrooms as well. Classrooms supporting other teaching styles could have additional settings and tools that the style or philosophy needs. At the same time, all classrooms require and would benefit from some default settings, such as ergonomic, practical, and ideally space-saving students' desks and chairs. These default requirements could be designed by considering the MI settings proposed in this thesis.

9.2 CONCLUSIONS

The three key conclusions of this study are: : (1) case study classrooms settings support mainly traditional view of intelligence and teaching; (2) applying MI theory to classroom designs could lead to more efficiency in learning environments; and (3) New Zealand schools could benefit from applying the different MI settings.

With respect to the first conclusion, it was observed during the data collection process that the classroom settings mainly supported traditional teaching styles, even though the teachers used different teaching styles. Classrooms depended mainly on two basic settings, the mat and the tables that encouraged learning through reading, writing, teacher's instructions and lectures, and group work. Other settings, such as art areas, in the classrooms were not used often. Observation and feedback from students and teachers suggest the need for innovation and developments of interior settings to match student's abilities and learning styles, and teacher's teaching styles.

The second conclusion — that designing according to the MI theory could help in improving classroom settings — is based on the fact that the theory considers several ways for teaching and learning. Accordingly, MI settings

also help in expressing knowledge in different ways. MI settings, if used wisely, address all intelligence types and give students more opportunities to learn through modes they find most suitable and/or enjoyable. Multiple intelligences settings are a well-designed cluster of settings that can improve classroom designs and the learning process for both students and teachers.

Deriving from the first and second conclusions, the third and the main conclusion is that New Zealand schools appear to lack various MI settings and may need to integrate the MI theory in classroom through applying MI settings. Existing settings, in case study classrooms, hardly supported more than linguistic and logical-mathematical intelligences. Other intelligences are either not supported or are in need of more attention. In order to support different abilities and intelligence profiles, all the intelligences should be supported in balance. In conjunction with a suitable curriculum, good teaching strategies, and balanced lighting, acoustics, and other design elements, MI settings aid the design process of the optimum well designed classroom for New Zealand primary schools.

REFERENCES

American Architectural Foundation. (2006). Designed for Learning. Retrieved August 25, 2009, from New Zealand Ministry of Education website: http://www.minedu.govt.nz/NZEducation/EducationPolicies/Schools/SchoolOperations/PropertyManagement/StateSchools/PerformingClassrooms/PerformingClassroomsUsefulWebsites.aspx

Armstrong, T. (1994). Multiple Intelligences: Seven Ways to Approach Curriculum. *Educational Leadership*, 52, 26-28. Retrieved from http://www.thomasarmstrong.com/articles/7_ways.htm

Armstrong, T. (2009). *Multiple Intelligences in the Classroom*. Alexandria, VA, USA: ASCD.

Arnold, E. (1998). *The MI Strategy Book*. Chicago, Illinois, USA: Zephyr Press.

Baum, S. Viens, J. Slatina, B. (2005). *Multiple Intelligences in Elementary Classrooms*. New York, NY: Teachers College Press.

Bergsagel, V. Best, T. Cushman, K. McConachie, L. Sauer, W. Stephen, D. (2007). *Architecture for Achievement: Building Patterns for Small School Learning*. United States of America: Eagle Chatter Press.

Brualdi, C. (1996). Multiple *Intelligences: Gardner's Theory ERIC Digest, ERIC Clearinghouse on Assessment and Evaluation Washington DC*. Website: http://www.k12connections.iptv.org/documents/KinderNatureMultipleIntellegences.pdf

Business School, The University of Auckland. Wise Choices - How to Make the Right Decision - Half-day Snapshot. Retrieved May 13, 2010, from http://www.shortcourses.auckland.ac.nz/courses/386/2253/

Clyde Quay School (2010). *Our School*. Retrieved September 2, 2010, from: http://www.clydequay.school.nz/Site/our_school/

Chicago History Museum. (2007). About Louis Sullivan. Retrieved March 17, 2010 from http://www.sullivan150.org/

David, E. Gruba P. (2002/2007). *How to Write a Better Thesis*. Carlton, Victoria, Australia: Melbourne University Press.

Day, C. & Midjber, A. (2007). *Environment and Children*. Amsterdam: Elsevier Ltd.

De Monchauux, T (2007). A is for Adaptable. *International Design magazine, 54, 52-55.*

Drury, C. G. (1995). Methods for Direct Observation of Performance. In J. Wilson & E Corlett, *Evaluation of Human Work* (pp. 45-68). London, England: Taylor and Francis.

Dudek, M. (2005). *Children Spaces*. Oxford, UK. Architectural Press.

Evans, S. (2007, August 15). Discussion into the potential of classroom response systems to teach higher order thinking skills. Retrieved May 13, 2010 from Educating the dragon website: http://educatingthedragon.edublogs.org/articles/

Fisher, K. (2005). Linking Pedagogy and Space, Proposed planning principles, Department of Education and Training [Victoria] Retrieved August 25, 2009, from New Zealand Ministry of Education website: http://www.minedu.govt.nz/NZEducation/EducationPolicies/Schools/SchoolOperations/PropertyManagement/StateSchools/PerformingClassrooms/PerformingClassroomsUsefulWebsites.aspx

Gardiner, W. (1993). *The benefits of Kura Kaupapa Maori*. Wellington: Te Puni KoKiri.

Gardner, H. (1983, 2004). *Frames of Mind*. New York, NY, USA: Basic Books.

Gardner, H. (1998). A Multiplicity of Intelligences. *Scientific American, 9*(4), 18-23.

Gardner, H. (2001). *The Three Faces of Intelligence*. Retrieved October 25, 2009, from Howard Gardner website: http://www.howardgardner.com/Papers/papers.html

Gardner, H. (2003). *MI after Twenty years*. Retrieved October 25, 2009, from Project Zero website: http://pzweb.harvard.edu/PIs/HG_MI_after_20_years.pdf

Greig, A., Taylor, J., & MacKay T. (2007). *Doing Research with Children*. Los Angeles, CA: SAGE Publications.

Geoffrey, R. (1997). School Life. *Architecture New Zealand*, 78-94.

Groundwater, S, (1979). The Child's Right to a Stimulating Learning environment. *Architecture Australia*, *68*, 54-55.

Hale, B. & MacLean, K. (2004, September 24). Overview of Steiner Education. Retrieved December 9, 2009, from Steiner Schools in Australia website: http://www.steiner-australia.org/other/overview.html

Hardy Holzman Pfeiffer Associates. (1974). EVOLUTION OF THE CLASSROOM. *Design Quarterly*. 42-43.doi http://www.jstor.org/stable/4090842

Hays, B. (2008). Teachers making a difference: the principals in action: Rangiora High School example. Retrieved May 13, 2010, from University of Canterbury website: http://www.edplus.canterbury.ac.nz/news/features/documents/tmad_conference/tmad_principles_rangiorahs_2_to_be_pdf-ed.pdf

Hoerr, T. (2010). A Multiple Intelligences Library. Retrieved March 9, 2010 from New City School website: http://www.newcityschool.org/OurMILibrary_980.aspx

Kane, P. J. Pilcher, M. Legg, S. J. (2006). *Development of Furniture system to Match Students Needs in New Zealand Schools.* International Ergonomics Association. . Retrieved February 1, 2011, from: http://furnware.co.nz/Portals/0/Documents/World%20ergo%20congress%20paper.pdf

Kliment, S. (2001). *Elementary and Secondary Schools.* Canada: John Wiley & Sons, Inc.

Knudson, D. (2006). *Gifted Education in New Zealand Primary schools 1887-2005.* Wellington: NZCER Press.

Kosak, S. & Groudine, M. (2004). Form Follows Function: The Genomic Organization of Cellular Differentiation. *Genes & Development,* 18, 1371-1384.

Lackney, J. (1999, February 8). A History of the Studio Based Learning Model. Retrieved March 17, 2010 from Mississippi State University website: http://www.edi.msstate.edu/work/pdf/history_studio_based_learning.pdf

Lewis, G. (2001, December). Rudolf Steiner. Retrieved December 9, 2009, from Freedom-in-Education.co.uk website: http://www.freedom-in-education.co.uk/Steiner.htm#definition

Lillard, A. Else-Quest, N. (2006). Evaluating Montessori Education. *Science*, *313*, 1893. Doi: 10.1126/science.1132362

Mackay, C. (2003). *Sunshade Design in New Zealand primary Schools*. The 20th Conference on Passive and Low Energy Architecture, Santiago, Chile. Retrieved August 15, 2010, from: http://www.cancernz.org.nz/Uploads/PrimarySchoolsSunShadeDesign.pdf

May, H. (2005). *Schools Beginnings: a Nineteenth Century Colonial Story*. Wellington: NZCER Press.

McLachlan, S. (2002). School lessons. *Architecture New Zealand*, *7*(4), 52-58.

Ministry of Education. (2009a). Education in New Zealand. Retrieved April 14, 2010, from http://www.minedu.govt.nz/Parents/AllAges/EducationInNZ.aspx:

Ministry of Education. (2009 b). Kura Kaupapa Maori and Kura Teina. Retrieved December 4, 2009, from Education Counts website: http://www.educationcounts.govt.nz/indicators/quality_education_providers/2011

Montessori Aotearoa New Zealand. Montessori learning materials. Retrieved December 7, 2009, from: http://www.montessori.org.nz/learning-materials

Multiple Intelligence International School (2008). *MI is More than a School*. Retrieved February 2, 2011, from: http://www.mi-childsplace.com.ph/main.php?h=2

Nair, P. & Fielding, R. (2002/2007). *The Language of School Design: Design Patterns for 21st Century Schools*. India: Design Share.

Nagamitsu, S. Yaguchi, H. Yoshida, Y. (1998). *Space Saving Working Equipment*. United States Patent, 5,765,315. Retrieved August 16, 2010, from: Free Patents Online, http://www.freepatentsonline.com/5765315.html

National Institute for Direct Instruction. *About Direct Instruction (DI)*. Retrieved March 10, 2010, from

http://www.nifdi.org/15/index.php?option=com_content&view=article&id=52&Itemid=305

New City School. (2010). Multiple Intelligences as a Tool. Retrieved from website: http://www.newcityschool.org/WhatisMI_19.aspx

New Zealand Ministry of Education. (2009, October 22). *Schools in New Zealand*. Retrieved March 18, 2010 from http://www.minedu.govt.nz/Parents/AllAges/EducationInNZ/SchoolsInNewZealand.aspx

Northland School (2010). *About Us*. Retrieved September 2, 2010, from: http://www.northland.school.nz/About+Us/?PHPSESSID=20aef2958ed5464720c21feef152b65e

O'Rourke, M. (1992). *Devolution in the New Zealand Education system*. Wellington: Ministry of Education.

Pinehurst Primary school. *Pinehurst Primary Years 1-6*. Retrieved May 13, 2010 from http://www.pinehurst.school.nz/default.aspx?MenuId=8

Project Zearo. (2009). *Research Projects*. Retrieved from http://pzweb.harvard.edu/Research/Research.htm

Rauterberg, M. (2010, February). *Direct observation*. Retrieved from http://www.idemployee.id.tue.nl/g.w.m.rauterberg/lecturenotes/UFTdirectobservation.pdf

Roseneath School (2010). *Our School*. Retrieved September 2, 2010, from: http://www.roseneath.school.nz/Roseneath_School/Our_School.html

Scaife, M. Rogers, Y. Aldrich, F. Davies, M. (1997). Designing for or Designing with? Informant design for interactive learning environments. Conference on Human Factors in Computing Systems, Proceedings of the SIGCHI conference on Human factors in computing systems. Brighton, UK. 343 – 350. Doi: http://doi.acm.org/10.1145/258549.258789

Scapens, M. (2007). *Implementing The theory of multiple intelligences in the junior secondary school* (Master thesis, The University of Waikato, Hamilton, New Zealand). Retrieved from http://waikato.researchgateway.ac.nz/handle/10289/2284

Schagen, S. & Hipkins, R. (2008). *Curriculum changes, priorities and issues: findings from the NZCER secondary 2006 and primary 2007 national surveys*. Retrieved May 13, 2010 from NZCER website: http://www.nzcer.org.nz/pdfs/16591.pdf

Schargel, F. (2001). *Strategies to Help Solve our School Dropout Problem*. Larchmont, N.Y. Eye on Education.

Sexton, S. (1990). New Zealand Schools: An Evaluation of recent reforms and future directions. New Zealand Business Roundtable.

Sheerin, B. (2009). Personal comunication lecture handout folloing meeting on August 2009,at New Zealand Ministry of Education.

Smith, G. (1991 a). *In absentia: Maori education policy and reform*. Auckland: University of Auckland.

Smith, G. (1991 b). *Tomorrow's schools and the development of Maori education*. Auckland: University of Auckland.

Smith, G. (2003). Kaupapa Maori Theory. 'Kaupapa Maori Symposium 'NZARE / AARE Joint Conference. Auckland, NZ. Retrieved from: http://www.aare.edu.au/03pap/pih03342.pdf

Stanford, P. (2003). *Multiple Intelligence for Every Classroom*. Intervention in School and Clinic, 39, 80-85. Doi: http://isc.sagepub.com/cgi/content/abstract/39/2/80

Sword, H. (2007). Teaching in Colour: Multiple Intelligences in the Literature Classroom. *Pedagogy: Critical Approaches to Teaching Literature, Language, Composition and Culture, 3*(2), 223-250. Doi: 10.1215/15314200-2006-032

The Gardner School (2011). *Mission, Vision and Core Values*. Retrieved February 2, 2011, from: http://www.gardnerschool.org/about-the-gardner-school/mission-and-core-values/

The key school website. (2009). School History. Retreiverd from http://www.keyschool.org/about_key/index.aspx

The New York City Department of Education (2011). *Multiple Intelligence School*. Retrieved February 2, 2011, from: http://schools.nyc.gov/SchoolPortals/10/X037/default.htm

The New Zealand Curriculum Online (2011). *Fact sheet 6: National Standards and the NZC*. Retrieved from: http://nzcurriculum.tki.org.nz/National-Standards/Key-information/Fact-sheets/National-Standards-and-the-NZC

Thorndon School (2010). *About the School*. Retrieved September 2, 2010, from: http://www.thorndon.school.nz/aboutschool.htm

University of Canterbury. *EDTL740-08X (D) General non-calendar-based 2008* (Distance) Multiple Intelligences in the Classroom. Retrieved May 13, 2010, from http://www.canterbury.ac.nz/courseinfo/GetCourseDetails.aspx?course=EDTL740&occurrence=08X+(D)&year=2008&source=courses

Waipahihi School. (2003). *HOTS - Higher Order Thinking Skills*: Senior school. Retrieved May 13, 2010 from http://www.waipahihi.school.nz/hots.htm

Wellington Schools 2010. (February, 4, 2010). Retrieved from: O'Connor, S. School Property Adviser at New Zealand, Ministry of Education

Whitlock, J. Dodd, G. (2004). *Classroom acoustics: Milestone 6 report*. Auckland Uni-Services Limited. Retrieved August 16, 2010, from: http://www.minedu.govt.nz/~/media/MinEdu/Files/EducationSectors/PrimarySecondary/PropertyToolbox/StateSchools/Design/Acoustics/ClassroomAcoustics.doc

Wylie, C. (1990). *The impact of tomorrow's schools in primary schools and intermediates*. Wellington: New Zealand Council for Educational Research.

Yin, R. (1994). *Case Study Research: Design and Methods*. London, England: SAGE Publications.

Yin, R. (2009). *Case Study Research: Design and Methods* (4th ed.). United States of America: SAGE Publications.

APPENDICES

Here is an example of Case study data collecting from Appendix D. The rest appendices of the thesis are available in the attached CD.

D.1.   The Roseneath Classroom

School name:	Roseneath School	Date of interviews:	22/ 06/ 2010
School year:	Year 5-6	Date of observation:	21/ 06/ 2010
Number of teachers:	1	Time of observation:	9:00 am- 3:00 pm
Number of students:	29	Age range:	9-11year olds

D.4.1. Classroom measurements.

TABLE D-11: FURNITURE DETAILS IN ROSENEATH CLASSROOM.

Type of furniture	#	Materials	Colours	Dimensions
Student's chair 1	8	Plastic + metal	Light blue	X: 34, Y: 38, Zs: 40, Z b: 76 cm
Student's chair 2	4	MDF + metal	Beige/ Blue	X: 35, Y: 34, Zs: 41, Z b: 73 cm Or X: 30, Y: 31, Zs: 40, Z b: 70 cm
Student's chair 3	6	Plastic	Dark blue	X: 34, Y: 38, Zs: 40, Z b: 74 cm
Computer chair	5	Upholstery + metal + plastic	Red/ Blue/ Gray	X: 40, Y: 44, Zs: 54, Z b: 82 cm
Teacher's chair 1	1	Upholstery + metal + plastic	Blue	X: 41, Y: 47, Zs: 54, Z b: 99 cm
Teacher's chair 2	1	Upholstery + metal	Brownish yellow	X: 57, Y: 57, Zs: 40, Z b: 65 cm

Chair	1	Plastic + metal	Black	X: 37, Y: 45, Zs: 45, Z b: 76 cm
Student's desk 1	29	MDF + metal legs + Plastic trays	Green/ Dark gray	X: 47, Y: 60, Z: 68 cm
Student's desk 2	1	Wood	Light brown	X: 44, Y: 60, Z: 70 cm
Teacher's table	1	Wood	Light brown	X: 80, Y: 151, Z: 68 cm
Computer table 1	2	MDF + metal	Light brown + Green	X: 75.5, Y: 121, Z: 75.5 cm
Computer table 2	1	MDF + metal	Light brown + Green	X: 60, Y: 120, Z: 70 cm
Shelves 1	1	Wood (painted)	Red	X: 60, Y: 79, Z: 74 cm
Shelves 2	1	MDF	Light brown	X: 30, Y: 214, Z: 85 cm
Shelves 3	1	MDF	Light brown	X: 31, Y: 243, Z: 80 cm
Book shelves	2	MDF	White + Light green	X: 45, Y: 124, Z: 89 cm
Cabinet	1	MDF	Dark blue	X: 42, Y: 80, Z: 180 cm
Wall whiteboard	1	White board + Aluminium frame	White	X: 2, Y:242, Z: 122 cm
White board	1	White board + MDF frame	White	X: 46, Y: 94, Z: 116 cm
Sink bench	1	MDF	White	X: 47, Y: 99, Z: 81 cm

TABLE D-12: FINISHES AND DESIGN ELEMENTS IN ROSENEATH CLASSROOM.

Type of interior finish	Materials	Colours

Wall 1	Wood panels	Brown
Wall 2	Pin board	Light brown
Wall 3	Wood	Light brown
Wall 4	Carpet	Red
Wall 5	Painted	White
wet area wall	Aluminium sheets	White
Floor 1	Carpet	Dark green
Floor 2	Lino	Red
Ceiling	Plaster	White
Windows	Single glazed- Wooden frames	Light bluish green
Doors	Wood	Light bluish green
Roller blinds	Fabric	White/ Black

TABLE D-13: AESTHETICS DETAILS IN ROSENEATH CLASSROOM.

Lighting	Artificial: six fluorescent lighting fixtures. Natural: Good natural light comes through the windows. Sometimes, there is sun glare; the classroom has got light and dark blinds for this problem.
Ventilation system	The classroom depends on natural ventilation through doors and windows.
Cooling and heating	There is a heat pump on one wall, which makes the class warm most of the time. For cooling, there are two fans on the ceiling.
Acoustics	Acoustics treatments: carpet on floor and some of the walls, window blinds, and some upholstered furniture.
Security and safety	Only one exit in the class. There is a fire alarm, but no fire extinguisher.

D.4.2. Students' interviews.

TABLE D-14: DATA FROM STUDENTS' INTERVIEWS IN ROSENEATH CLASSROOM.

	Each cell represent one student				
	1	2	3	4	5
1-1 Where do you usually read books?	Desks				
1-2 Is the reading place comfortable?	Ok			Good	
	Comments: (1) It is comfortable (1) It is good near the window, but sometimes students need to use the blinds because of the glare				
1-3 Where do you usually write?	Desks and the mat	Desks			
1-4 Is the writing place good?	Ok	Good	Very good		
	Comments: (1) Hard to concentrate with noises inside the classroom (1) Mat is not good for writing (1) Two students sit by the window, where there are no distractions from the class				
1-5 Where in the classroom do you usually work the most?	Desk and computers	Desks			
	Comments: (1) Because it is the teacher's rules (1) Students have the trays that contain all their items (1) Because most of tasks involve working and writing on tables				
1-5 Are your table and chair comfortable?	Ok	Good to ok	Good		
	Comments: (1) The class has better chairs for just few students				
Classroom facilities:					
2-1 Do you think that there are enough computers for the entire	No				Yes

228

class?				
2-2 Is the computer area good?	Ok	Good		Very good
2-3 Where do you do science projects?	Outside	Mat	Desks and computers	Desks
2-4 Is the science projects place good?	No response	Bad	Ok	Good
	Comments: (1) Sometimes students do not have enough space (2) There is no enough room on tables (1) There is enough space for working			
2-6 Where do you do art?	Desks			
2-7 Is the area good for doing art?	Ok	Good	Very good	
	Comments: (1) Easy when drawing on small piece of paper			
2-8 Where do you play or learn with building blocks, wooden or plastic sticks, or any building materials?	Mat area			
2-9 Is the area good for building?	Ok	Good		
	Comments: (1) Sometimes the blocks fall down because of the carpet			
2-10 Do you play music in the classroom?	No			
	Comments: There is a music room in the school where students have music lessons			
2-11 Is the area good for playing music?	No response			

2-12 Is there a place where you can listen to some music?	No	Yes, with headphones	Yes, without head phones
	Comments: (1) Students listen to music at their desks		
2-13 Where do you do some drama/theatre?	Not in the classroom		
2-14 Is the area good for drama/theatre?	No response		
2-15 Where do you exercise?	Playground	Court	Playground and court
2-16 Do you learn natural science or other subjects with real animals and plants?	No		Sometimes
	Comments: (5) Students like to take care of animals inside the classroom		
2-17 Do you go outside and have some classes in nature?	Never		Sometimes
Storage in the classroom:			
3-1 Are there enough storage units in your classroom?	No	Yes	
3-2 Are the storage units in the classroom good?	Ok	Good	Very good
3-3 Can you easily access all the items you need from	Usually	Always	

the storage units and the shelves?			
	Comments: (3) The shelves we cannot reach are the teacher's.		
Working situations:			
4-1 How often do you work in groups?	Usually	sometimes	
	Comments: (5) Students work in groups at the desks or on the mat.		
4-2 Where could a student who wants to work alone work?	Student likes to work in groups	On a single desk	
4-3 Is there a place in the classroom where the entire class can sit together and learn?	Yes, on the mat		
4-4 Is there a quiet place in the classroom where you would go and work in peace?	No		Yes
	Comments: (1) At the desks		
Aesthetics:			
5-1 Do you like the colours in your classroom?	I don't like them	They are ok	I like them very much
	Comments: (1) The classroom does not have many colours (1) The colours are plain		
5-2 Is the lighting good for reading and writing? (sun glare)	Good	Very good	

	Comments: (1) Sometimes there is sun glare (1) There are few lighting fixtures			
5-3 Is the heating in the classroom good?	Ok	Very good		
	Comments: (2) It could be warmer			
5-4 Can you hear your teacher and your friends clearly inside the classroom?	Sometimes	Usually		Always
	Comments: (3) Unless the class is noisy and students are talking loudly			
5-5 Choose the textures that you can find in your classroom: *Smooth, Rough, Bumpy, Transparent, Semi transparent, Soft surfaces, Hard surfaces, Sand, or Other.*	Recognised two textures	Recognised three textures	Recognised four textures	Recognised six textures
	Comments: Most students recognised right textures and gave good examples One student gave a wrong example for semi transparent texture, where the example was the paper One student gave a wrong example for bumpy texture, where the example was the table			
5-6 Choose the materials that you can find in your classroom: *Wood, Metal, Fabric, Concrete, Glass, Plastic, or Other.*	Recognised three materials	Recognised four materials	Recognised five materials	
	Comments:			
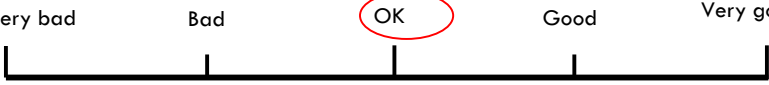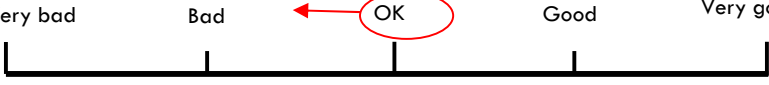
	Most students gave correct examples of the materials they recognised One student assumed that the posters in the classroom were made of fabric, instead of paper.		
General Questions:			
6-1 Do you like studying in your classroom?	It is ok		I like it
	Comments: (2) Sometimes it gets noisy		
6-2 Where is your favourite place in the classroom?	Desks	Computers	Mat
	Comments: (1) Students do not like sitting on the mat (1) Students can sit and read.	Students can play on them	Comfortable
6-3 Is there a place you do not like in your classroom?	No	The mat is uncomfortable	
6-4 Would you like to change your classroom?	No	Yes	
	Comments: Students would like to change: (1) More computers (2) Smoother carpet (1) The furniture arrangement: move desks to make it easier to move around (1) Put the heater above the white board, as students sit there		

D.4.3. Teacher's Questionnaire.

TABLE D-15: DATA FROM TEACHER'S QUESTIONNAIRE IN ROSENEATH CLASSROOM.

Existing Pattern of Use:	
1-1 Where do students usually read books?	At their desks, or on the mat
1-2 Is the reading place good?	Very bad — Bad — OK — Good — Very good

	If not ok, why? Not comfortable or relaxing for independent reading Ok when it is instructional reading (teacher guiding)
1-3 Where do students usually write?	At their desks, or on the mat
1-4 Is the writing place good?	Very bad Bad OK **(Good)** Very good If not ok, why? I would rather students had tables- much better for co-operative work but still good for independent work
1-5 Where in the classroom do students usually work the most?	Probably 50/50 desk+ mat Why? Desk – independent + some group Mat- instructional+ class
1-6 Is there a special space for you as a teacher?	**(Yes)** No Where? A desk behind a pillar
1-7 Is the teacher's area good?	Very bad Bad **(OK)** Good Very good If not ok, why? At least it is out of the way- I don't believe teacher space should be visible, but would love some shelves

1-8 In a typical school day, how long do you spend on these activities? (please write in percentages)	Teaching the class as whole	20 %
	Working with individuals or small groups	50 %
	Working with large groups	20 %
	Maintaining discipline	10 %
	Other	_____ %

Classroom facilities:	
2-1 Do you think that there are enough computers for the entire class?	**(Yes)** No I wouldn't want more in the class, because of the space they would use
2-2 Is the computer area good?	Very bad Bad **(OK)** Good Very good

	If not ok, why? No option- it is where they plugged it in- is out of direct light which is good. Rolly chairs can be a nuisance. If we need more, we have five laptops and a data projector that can come into class
2-3 Where do students do science projects?	In class: at desks, on the mat (might go outside for research, field trip etc.)
2-4 Is the science projects place good?	Very bad — Bad — (OK) — Good — Very good If not ok, why? Ok but not ideal- how it is at primary schools
2-6 Where do students do art?	In class at desks, or on the floor.
2-7 Is the area good for doing art?	Very bad — Bad — ←(OK) — Good — Very good If not ok, why? Again, the reality of primary schools. We don't have art rooms. Tables instead of desks would be better.
2-8 Where do students play or learn with building blocks, wooden or plastic sticks, or any building materials?	At their desk or on the mat- usually (almost always) on the mat
2-9 Is the area good for building?	Very bad — Bad — OK — (Good) — Very good If not ok, why? The mat is the best and students seem to prefer it to their desks.
2-10 Do students play music in the classroom?	(Yes) No. If yes, where? On the mat
2-11 Is the area good for playing music?	Very bad — Bad — (OK) — Good — Very good If not ok, why?

	We do have a music room upstairs, small but great for small music groups, kids can withdraw to attend.
2-12 Is there a place where students can listen to some music?	(Yes,) with headphones (Yes,) without headphones No. If yes, where? Upstairs, in the music room
2-13 Where do students exercise? (you can choose more than one)	(Inside) the classroom (At) the playground At the gym (Other) In the hall
2-14 Do students learn natural science or other subjects with real animals and plants?	(Yes) No If yes, do they enjoy taking care for animals? Yes.
2-15 Do students go outside and have some classes in nature?	Never Rarely (Sometimes) Usually Always
2-16 Is there any facility (such as music or art area) you wish were in your classroom?	(Yes) No If yes, what is it? An art area- drying racks, accessible shelves, paper drawers, material drawers.
Storage in the classroom:	
3-1 Are there enough storage units in your classroom?	Yes (No)
3-2 Are the storage units in the classroom good?	(Very bad) Bad OK Good Very good Why? Not enough and not efficient- shelves too deep or shallow, some units old- very heavy to move, shelves at back don't fit into space, so equipment drops behind.

3-3 Is there a lockable storage unit for items that students should not reach?	Yes ~~No~~
Working situations:	
4-1 How often do students work in groups?	Never Rarely Sometimes Usually **Always** (circled) Where? <u>At desks or on the mat</u>
4-2 Where could student who wants to work alone work?	(On a single desk) On a window bench (On the teacher table) <u>when it is tidy enough</u> (Other) <u>On the mat</u>
4-3 Is there a place in the classroom where the entire class can sit together and learn?	(Yes) No Where? <u>The mat area</u>
4-4 Is there a quiet place in the classroom where students would go and work in peace?	Yes (No) Where? <u>Not really- single desks, but not quiet</u>
Aesthetics:	
5-1 Do you like the colours in your classroom?	I hate them I don't like them They are OK **I like them** (circled) I like them very much Why? <u>I think the green is a peaceful colour and tones in with sea views. Art work looks good against the red wall. The white at the top is not so nice.</u>
5-2 Is the lighting good for reading and writing? (sun glare)	Very bad Bad OK **Good** (circled) Very good If not ok, why? <u>It can get too sunny and produce glare- but we have a filter and blackout blinds.</u>

5-3 Is the heating in the classroom good?	Very bad Bad OK Good (Very good)
	If not ok, why? <u>School has heat pumps to maintain steady temp for allergy affected students. I love my heat pump in summer and winter!</u>
5-4 Can students hear you clearly inside the classroom?	Never Rarely Sometimes Usually (Always)
	If not, why? <u>At least I think so</u>
5-5 Do you think that this classroom contains variety of materials and textures?	<u>Yes</u> (No) If not, what does it miss? <u>Tactile – nothing to enjoy feeling or touching; class is pretty basic really.</u>
5-6 Do you think more space is required in this classroom?	(Yes) No If yes, how will you use the extra space? <u>Sofas- reading corner, quiet spaces, cushions- for comfort and privacy</u> <u>Art area</u>
5-7 Do you think this classroom is crowded?	(Yes) No If yes, what does make it crowded? (you can choose more than one) • The class has more furniture than required (•) The furniture layout makes it crowded <u>but we need all the desks!</u> (•) The classroom is small • Other
General Questions:	
6-1 Do you like working in your classroom?	I hate it I don't like it It is OK (I like it) I like it very much Why? <u>I love the students' work on display and the fact that I can see all students most of the time. I wish they had comfort space</u>
6-2 Where is your favourite place in the classroom?	<u>Probably the mat- I enjoy working with small groups down there, all of us sitting on the floor.</u> Why?
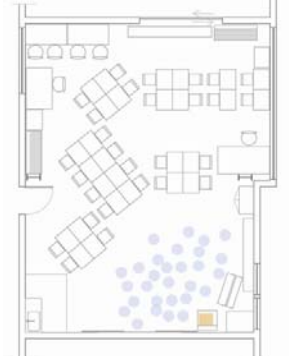
6-3 Is there a place you do not like in your classroom?	(Yes) No If yes, where? Probably the shelves at the back and the side. Why? Always look messy, shelves are not good sizes, so equipment is either stacked up or creates big gaps.
6-4 Would you like to change your classroom?	(Yes) No How? More space, tables (not desks), room for sofas and cushions, more, or at least more practical, cupboards , bigger bench/ wet area, paper drawers, doors opening on to veranda or the playground, less wood (I am not allowed to put staples into wood)
Questions about MI theory:	
7-1 Do you use multiple intelligences theory in your teaching methods?	(Yes) No If no, skip Questions 7-2, 3, 4, and 5.
7-2 How often do you use it?	When I can incorporate it - bouncing balls to learn time tables, a chain songs, object in hand to manipulate when listening, doodling while listening (sometimes)
7-3 Why are you using MI theory in your classroom?	Because I am aware that we all learn best in different ways.
7-4 Do you think that special settings may help you in using the theory?	(Yes) No How? Meet particular learning styles of students- optimise learning outcomes.
7-5 What do you suggest for an MI classroom design and settings?	Quiet spaces, fish tank (bubbles/ water), levels, and textures, sometimes wander whether it would be nice to have koru patterns (small) hard areas in carpet- students could rub!

239
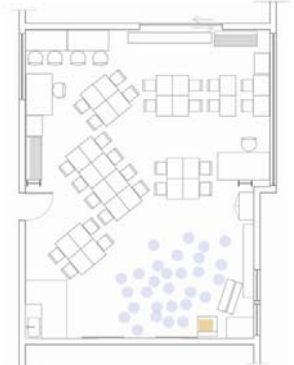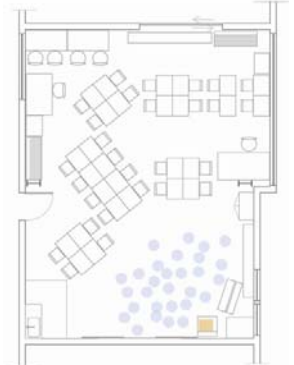
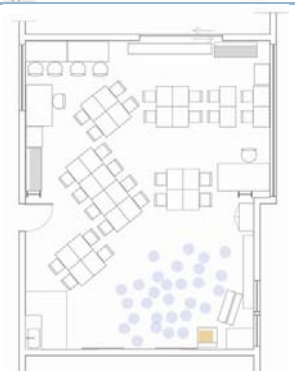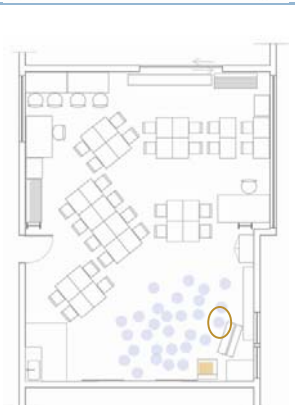|	Smooth wooden balls to feel in hands, headphones at desk would be cool!! Areas (tables) were groups can work and corrals for individuals who likes to be enclosed. Some smooth wood, rather than hard plastic. Sunny spaces + darker spaces as well. Really lovely library corner.

D.4.4. One School Day observation.
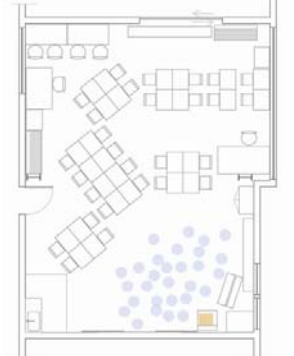
TABLE D-16: THE OBSERVATION SHEET, ROSENEATH CLASSROOM.

Activities that Involve Using the Classroom Settings	Time of the Activity	Settings Used During the Activity and Participants' Movements	Plan sketch	Number of Participants
Morning attendance	9:00 am – 9:05 am	Students on the floor Teacher sitting on the chair		All students and the teacher
The school day timetable + some instructions	9:05 am 9:15 am	Teacher working on the whiteboard Students on the floor		All students and the teacher
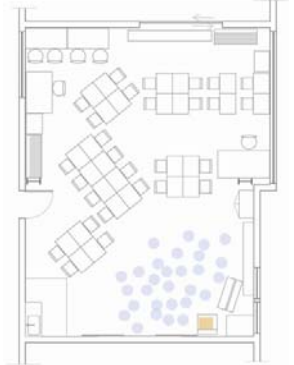
Discussion about the world cup	9:15 am 9:25 am	Same settings		All students
Writing activity The classroom is in a mess as the students are preparing for sale	9:25 am 9:35 am	Desks and chairs for students Teacher walking around		All students and the teacher
The teacher starts individual discussions Students from another classroom come to use the computers in this classroom	9:35 am 9:45 am	Floor area		One teacher and one student
Students checking with the teacher one by one, then the entire class (instructions and questions) The students working on computers from the other classroom are making noises	9:45 am 10:04 am	Desks and floor area		All students

Some writing activities A group left for a dancing club Another group left with another teacher Teacher sitting at the computer table Students go to ask her some questions and return to their desks	10:04 am 10:25 am	Desks and chairs Floor area		The rest of the students
Checking work	10:15 am	Students queue near the teacher's table then return to desks		Five students
Working on the floor One student was annoyed because of the sun glare. He wanted to drop off blinds, but he could not reach the rope to drop the blinds. He went back to his desk and put a book in front of him to protect his eyes from the sun glare	10:15 am	Floor area		Two students.
Discussion before morning tea	10:25 am 10:30 am	Floor area		All students

Morning tea After eating, the students go outside for some play and fresh air. Some students from another class come and have their morning tea in this classroom	10:30 am 10:50 am	Students eat inside the classroom some at the tables, others on the floor		All students
Silent reading	10:50 am 11:05 am	Desks and chairs The teacher is working on the computer with one student		All students
The entire class teaching, including some group work (the floor is too small for group work)	11:05 am 11:45 am	Mat area		All students
A student uses the small white board to write on a sheet (the class is warm, but only when the door is closed)	11:15 am	White board		One student

Body activities	11:45 am 11:50 am	Mat area (students are standing and doing some moves)		All students One teacher
Individual work Some are standing and others are sitting on chairs	11:50 am 12:00 pm	Desks and chairs		All students
Students start to gather around the teacher, discussing some issues and lining up to go for some fitness activities	12:00 pm 12:05 pm	Move from everywhere to the door		All students Except one student who has feet injury.
Lunch break Students play on computers during the break Some draw, others play, and a group just watch and comment	12:30 pm 1:30 pm	Eating at the tables and on the floor		All students

Students gather on the mat area (usually, students do not spend so much time on the floor; this day the task took long time to finish)	1:30 pm 1:40 pm	The floor and the whiteboard		All students
Students take their work and complete it at their desks (When students finish their work, they either go and check with the teacher, or go to the mat area to copy the work on the white board.	1:40 pm 2:00 pm	Desks and chairs		All students
The teacher is working with a couple of students	1:50 pm	On the floor		Two students One teacher
Most students are on the mat, working and checking with the teacher The teacher sits on the floor with her students Some students use the sink to wash their hands	2:00 pm 2:30 pm	Floor area		Most students

One student works on the computer	2:10 pm	Computer station		One student
Free time: students can do whatever they want after finishing the main tasks of the day	2:30 pm 2:45 pm	Anywhere and everywhere		All students
Students get ready to leave the school and start leaving the classroom	2:45 pm 3:00 pm	Moving from their places to the bags hooks outside the classroom		All students